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PHILADELPHIA'S GAS PROBLEM

Revelations from Past History, and a Statement of Prospective Difficulties and Opportunities

By Arthur Spencer

PHILADELPHIA'S gas question is by no means settled, in spite of the overwhelming defeat of the proposed lease of the plant for seventy-five years at a ruinously low figure. For in 1907 the option to terminate the thirty-year lease, negotiated eight years ago, will expire, and it is maintained by some persons that the City should exercise this option, while others frown on municipal operation of the Gas Works and believe that the public should not take them over. The City has three alternatives—to let the present lease stand until 1927, to cancel it and itself undertake the operation of the works, or to effect a lease to new parties on more advantageous terms to the City. It will possibly be of interest to give some idea of the situation which now confronts the citizens of Philadelphia, tired alike of political corruption and corporate abuses.

The City first embarked in the manufacture of illuminating gas in 1835, under a combination of public and private operation and ownership. The property was acquired by the Municipality as sole owner in 1841, but the management was handed over to a board known as the "Gas Trust," with which neither the City Councils nor any other officers could interfere. The City could free itself from the dominion of this irresponsible body only with the maturity of all the bonds placed under its care, which did not come about until 1885. During the whole of this interval of about forty-five years Philadelphia, though it possessed entire ownership of the works, was unable to control their operation.

With the adoption of the new city charter, known as the Bullitt Bill, in 1887, a new era in the history of the enterprise began. For the next ten years the City was to have complete responsible control of the gas supply, and these are the only years of complete municipal control in the history of the undertaking. The Bureau of Gas was placed under the charge of the Director of Public Works, and until 1897 the management of this Department, though very far from what it should have been because of the prevalence of the spoils system, showed a distinct improvement over the demoralized conditions of private supervision.

When the City had acquired the control of the works they were in poor condition, and the City started out under extremely unfavorable circumstances in other respects. The spoils system had been developed to so consummate a degree of perfection that a reform committee which aided in the prosecution of the Trust found more political underlings and henchmen on the pay-rolls than the works could accommodate, even when placed shoulder to shoulder. The value of the dilapidated plant and leaky service-pipes under such conditions of operation may readily be imagined. Bad as has been the political and civic rottenness of Philadelphia between 1885 and the present time, there has never been the utter defiance of public welfare and common decency, in the Gas Works, which existed before they were taken over by the City twenty years ago.

In spite of these great difficulties in the path of successful administration, the City reduced the price of gas per thousand cubic feet from \$1.50 to \$1.00 in 1894, and also introduced such economies of manufacture that by 1890 the amount paid in salaries and wages per thousand cubic feet was only twenty-seven cents, as compared with nearly seventy-six cents in 1870, and by 1896 it was only twenty-two cents. This is rather surprising, when one takes into account the manner in which the local assembly interfered in the administration of the Department, employing it as a means of rewarding hangers-on for political services. The entire cost of manufacture, however, was not diminished as would have been the case under a tolerably efficient administration. Improvements were neglected in order that the City's tax-rate might be lowered with the funds which should have been used to facilitate reductions of price and improved service. The introduction of improved processes of manufacture was overlooked, and as a result the City found itself in a position to buy water-gas from a corporation more cheaply than to make it itself. In 1896 over 38 per cent. of the total amount of gas furnished was purchased from the Philadelphia Gas Improvement Company. The City, had it not neglected to supply itself with proper facilities, could have manufactured water-gas at a cost much

below thirty-seven cents per thousand, the price paid the corporation. The ease with which this gas was obtained tended to discourage expenditures on the existing plant, and the distributing system was not properly developed, with the result of an enormous waste through leakage, amounting in 1896 to nearly 25 per cent. of the total amount manufactured. When, in addition to this, account is taken of the large waste in wages incident to the spoils system, the practical evil of the municipal control experiment, under the conditions then obtaining in Philadelphia, is sufficiently obvious. Professor Bemis has justly said that the blame for this result rests on the community, which was not sufficiently imbued with that spirit of municipal reform which, starting in Great Britain, has been rapidly sweeping over America.

In 1883 the City received its first offer from a private concern—\$10,000,000 for the plant and an exclusive franchise. New offers were made in subsequent years, but were usually opposed by the City Council as well as by the public. In September, 1897, however, Mayor Warwick transmitted to that body an offer from the United Gas Improvement Company which was the outcome of carefully laid plans, and a settlement was cunningly pushed through from which the City could not withdraw. There was, in fact, no opportunity for a public realization of the gravity of the step. Discussion was suppressed, a proposal much less favorable than other offers made by responsible parties was accepted, and the Gas Works were leased to the Company for thirty years. While there were some who considered this action very unwise, the mass of the population saw no harm in the lease, or, if they saw it, lacked the courage to take matters into their own hands and defeat the combination dominating the local governing body of the City.

With the aid of a skilful lobby, which even had the hardihood to enter upon the floor of the Councils and from that point of vantage direct its fight for the lease, those who had already obtained control of the street railway and electric lighting franchises of Philadelphia now found themselves in possession of an assured monopoly for which they were not obliged to pay as much as had been offered by competing companies.

The lease gave the Company a monopoly for thirty years, subject to the right of the City to terminate the arrangement at any time prior to July 1, 1907, on condition that the Company, in that event, be re-imbursed for all improvements, with six per cent. interest on all sums expended on them. In return for the privilege of undisturbed possession, the Company agreed, among other things, to furnish gas at \$1.00 per thousand cubic feet, and to pay a rental determined as follows: all sums received in excess of ninety cents per thousand cubic feet before 1908 to be paid to the City; till 1913, sums exceeding eighty-five cents per thousand; till 1918, sums exceeding eighty cents per thousand, and then, until the expiration of the lease on December 31, 1927, all sums in excess of seventy-five cents. The City Council, however, was given the right to fix the price at ninety cents during the first two years, eighty-five cents from 1908 to 1913, eighty cents from 1913 to 1918, and seventy-five cents from 1918 to 1927, the City, in that case, receiving no money rental.

On its face, a contract of this sort is open to grave objection, if only because the City must be deprived of its rental after the price of gas has been reduced to a point at which liberal profits are still possible. The best way, however, to get an idea of the bearings of such an agreement on the public welfare is by studying how it has worked during the eight years that it has been in force.

The City received last year an income from the lease of about \$650,000, and a recent quarterly statement indicates that the rental payment for the present year will be more than \$700,000. If 5 per cent. of the structural value of the plant be taken as a fair basis of rental, the City is well recompensed at the above figures so long as the property is not actually worth more than about \$13,000,000.

As was previously shown, the plant was much depreciated in value when the City handed it over to the Company in 1897. Improvements had been neglected, and although the people voted by an immense majority, only a week before the lease was signed, to expend a million dollars to improve the works, the United Gas Improvement Company, which had been selling gas to the City under the municipal operation regime, had long been suspected of influencing the Councils in discouraging all improvements which might have the result of injuring its own business. Bearing in mind that all recognized authorities are agreed on the necessity of marking off a large percentage of the value of a plant every year for depreciation, it is evident that the property with which the leasing corporation started in upon its contract could not have been very valuable. On the surface, therefore, the City is obtaining a good rental on the capital which it has actually invested in the Gas Works.

When we look below the surface, however, we find that the advantages of the rental are offset by certain drawbacks. The Director of Public Works stated in May, 1896, that by expending \$1,500,000 for improvements the City could at once have reduced the price to seventy-five cents, while by progressive management it is possible that the City could soon have furnished itself with gas at an even lower price. But instead of profiting by the improvements which are constantly being introduced into the manufacture of gas, it has been paying \$1.00 per thousand cubic feet ever since 1897. In other words, the City has been taking money from the pockets of its own citizens to provide the Company with the funds with which to pay its high rental to the City.

While the City has had the right, since 1897, to reduce the price during the first ten years to ninety cents per thousand, it could not have done so without depriving itself of the rental of ten cents per thousand cubic feet sold which it has been receiving in substitution for the reduction. Yet even ninety cents would be a price much too high. The Company has recently admitted the cost per thousand cubic feet delivered to be sixty-one cents. This is a higher cost than would be necessary in an improved up-to-date plant, which the Philadelphia plant is not. It is so large as to give rise to the suspicion of concealed profits, although the cost of manufacture and distribution is frequently claimed to be as high by gas companies in our large cities. Yet even on the supposition that sixty-one cents is not an excessive cost, it is still true that the City pays at least fifteen cents more

than is reasonable. The Company could sell the gas for eighty-five cents, and still set aside each year about \$500,000 for depreciation, about \$275,000 for improvements and extensions, and another \$275,000 for dividends to its stockholders, and over all this pay the City ten cents on every thousand of cubic feet sold, without having to put its hand into its own pocket for one solitary cent. The amounts above given are ample for the purposes specified. From five to seven cents per thousand cubic feet is the ordinary depreciation charge, and on the basis of seven billion cubic feet sold annually the seven cent rate would give a depreciation charge of \$490,000, which is certainly ample for the purpose of offsetting deterioration in the plant and equipment. Adding seven cents to sixty-one cents, and a rental of ten cents to that, we get seventy-eight cents as a price covering manufacture and distribution, depreciation and rental, but without any allowance for dividends or for a margin of profit from which improvement and extension charges can be met. Four cents for improvements would provide annually about \$275,000, and another four cents would provide a similar amount for dividends. As a matter of fact, however, so large an amount for dividends would be unreasonable. The Company has not had to furnish more than a small amount of capital; the City has provided the plant and practically all the capital, and the Company has secured the funds for its larger undertakings from the gross receipts, which are vastly in excess of the running expenses. The capitalization of the leasing corporation, under a sound system of public control, would consequently be very small, perhaps not over \$1,000,000, with a correspondingly large reduction in the dividend charge allowed for in the above calculations.

The leaders of the United Gas Improvement Company, who are said to include men of the highest business and social standing in the community, by tampering with Councils and the Press in 1897, very adroitly managed to secure a charter for this gold mine which would leave its owners in the uninterrupted enjoyment of their income for ten years, and possibly longer. To these honored and respected magnates the City is now paying cheerfully and contentedly a stipulated toll of at least \$1,000,000 a year in the form of extortionate prices.

Equally serious are the objections to the lease based upon its probable effects in the future. The arrangement by which the City, if it exercises the option to take over the works, must pay for all improvements and betterments made by the corporation, with interest at 6 per cent. thereon, is unduly generous to the Company. The latter claims to have expended up to this time for such objects considerably more than \$10,000,000. It now appears that in this sum are included expenditures for lamp repairs, repaving foot-ways, overhauling service mains, and purchases of red lanterns, paint brushes, and candles. In other words, the Company has been charging its ordinary repairs and maintenance to a greater or less extent as "betterments." It is a clever dodge. Should the City take over the plant, it must pay all those expenses which should properly be shouldered by the Company, i. e., the ordinary expenditures for maintenance and depreciation, which should be met from earnings. It has not expended any of its own capital for these purposes

but has secured its funds from the public, and it proposes that the public shall pay twice for the work necessary to keep the plant in good repair. Meanwhile that portion of the profits which should have been applicable to defray this expense is being skilfully side-tracked into the pockets of stockholders.

If, on the other hand, the City should not avail itself of the option, it will flee from one form of plunder only to fall a victim to another. Until 1927 it is bound to a one-sided agreement which every year will grow more profitable to the Company and less advantageous to the community. It will have no other alternative but to choose between paying prices for gas far in excess of the reasonable charges possible under steadily improving conditions of manufacture, and dispensing with the rental accepted in lieu of reductions of price. Thus, the power is given to the Councils to reduce the price at certain intervals, but the acceptance of the reduction means the forfeiture of the rental, for the agreement was so drawn that the rental should be paid only as an alternative to an equivalent reduction in prices. It is purely a question of bookkeeping for the City. Shall it raise funds to lower its tax rate by charging its own citizens high prices for gas, or shall it benefit its citizens by giving them a reduction of price at a sacrifice of the revenue needed for its own treasury? Nothing can be plainer than that the City is entitled to a rental for the use of its own property, regardless of the revenue derived from it by the lessee, and likewise that the citizens are justified in having the price of gas reduced as fast as the development of modern processes and appliances justifies such reduction. Yet this lease declares that the City can have lower prices only by furnishing the funds.

The Quaker City is thus confronted by a pitiful dilemma. It is problematical whether the courts would rule that expenditures for depreciation and maintenance do not come under the head of "Improvements," and, should the City take over the works before the option runs out, it will doubtless have to pay an enormous sum in the form of expenses which should rightly have been undertaken by the Company. The City thus has to choose between spending millions of dollars to get back its own property, and putting up for the next twenty years with organized robbery of the public. Whichever of these alternatives is chosen, the City cannot fail to lose heavily. The best way out of the dilemma would perhaps be for it to take over the works, either for the purpose of running them itself or of making a lease with new parties on more favorable terms. By a new lease some of the money lost through the lump-sum payment on the cancellation of the old one could no doubt be recovered. The City would still have to be mulcted for the depreciation for which it should never have paid, but the new lessee could be compelled to shoulder the load of depreciation and improvements, and in this manner the City might be in a position to get back, in time, a portion of its outlay. It must be said, however, that this is a very unpleasant way to get rid of the lease.

Of the three possible alternatives, that of cancelling the lease and re-assigning it to some more responsible corpora-

tion seems least likely to be adopted; the City will probably choose either municipal operation or a continuance of the present agreement. Philadelphia, however, is too much demoralized by the subservience of public office to private ends, in high places as well as low, to undertake municipal operation with the prospect of anything more than a mediocre success. And the continuation of the lease means of course the perpetuation of legalized plundering, the drain

of which will grow more exhausting from year to year. Must one, then, be pessimistic, or is it possible that Philadelphia will rise to its opportunity; and pay the ransom which is unavoidable if it wishes to deliver itself from corporate greed and turn over its Gas Works to a Company which will manage them for the public good? One prefers this more hopeful view, though it is perhaps the one least appropriate to the facts.

A MODERN FILTER PLANT

The Installation of Mechanical Filters at Danville, Va.—Details and Results

By Freeland Howe, Jr.

THE Pittsburgh Filter Manufacturing Company, of Pittsburgh, Pa., has recently completed and put into operation at Danville, Va., a mechanical gravity filter plant with a daily capacity of 2,000,000 gallons. The contract between the City of Danville and the Company was signed August 8th, 1904, and the official test was completed August 4th, 1905.

The supply is taken from the Dan River, a source which at times becomes very turbid, owing to the large amount of clay washed from the highly cultivated fields on the watershed. Throughout the official test the turbidity of the crude supply did not fall below 130 of the silica standard.

The water flows by gravity from the river to a concrete coagulating basin, 145 feet long, 37 feet wide, and 11 feet deep. The basin will hold 500,000 gallons, equivalent to a sedimentation capacity of six hours when the plant is running at its maximum rate. The basin has three vertical baffle-walls which prevent direct current through it and increase the sedimentation period. A general view of the basin and filter house is given in Figure 1, which shows that one side of the basin forms a wall of the filter house. The water in the basin is kept at a constant height by means of a large cylindrical float, operating a 24-inch shutter valve on the supply pipe. Besides the filters, the building contains a high-service Snow pumping engine and other machinery and apparatus. The house is designed so that two additional filters can be installed later.

From the coagulating basin the water passes by means of a 16-inch floating outlet to the filters proper. The filters consist of four units, each 15 feet inside diameter by 7½ feet length over all. They are made of Gulf cypress, both staves and bottoms being 2¾-inch thick when dressed, and securely bound together by substantial round-iron hoops with draw-lugs. The tanks are supported on dunnage pieces resting on the floor of the filter house. Each filter is equipped with an inlet controller, consisting of a float operating a butterfly valve on the 6-inch line, this being controlled, in addition, by a 6-inch gate valve. The water is distributed in the filter by an annular trough, 12 inches deep and 10 inches from the inner walls of the tank. The trough communicates through an 8-inch overflow pipe with the sewer through which the wash-water passes. The sand bed consists of 36 inches of No. 2 Birmingham sand, with an effective size of about 0.46 mm. and a uniform coefficient of about 1.2, and six inches of fine gravel. Embedded in the gravel are the Pittsburgh strainers, arranged on 6-inch centers. These connect with the laterals

and these, in turn, with the special cast-iron manifolds extending across the filters. The water passing to and from the filters below the sand bed is controlled by a four-way valve. Connected with this are a 6-inch wash-water line, a 6-inch discharge line to the clear water well, and a 4-inch re-wash or waste filtered water pipe. The line leading to the clear water well will be supplied with an automatic effluent controller. All valve stems have extensions reaching to the stands on the operating floor, which is 2 feet 7 inches below the top of the filters.

Each filter is equipped with a mechanical stirring device of the Pittsburgh Filter Co.'s usual design. The rakes can be either trailed on the surface of the sand bed or moved vertically through the sand, thus reaching the lower layers



FIG. 1.—COAGULATING BASIN AND FILTER HOUSE

of the sand bed during washing. The rakes are belt-driven, see Figure 2, which shows, also, the coagulating tanks on the platform in the roof. The coagulating plant consists of two cypress tanks, 6 feet by 6 feet, which can be used for either sulphate of alumina or sulphate of iron, and two iron tanks designed for the use of lime. The latter are equipped with glass gauges and so arranged that they can be used alternately. Each supplies a constant head box, from which the

water passes to the coagulating basin. From the filters the water passes to the clear water well, which is built of concrete and furnishes a foundation for the superstructure.

The clear water well is 59 feet long, 46 feet wide and 13 feet deep, with a capacity of about 225,000 gallons. The filter house is a slate-roofed brick structure 100 feet by 46 feet by 18 feet.

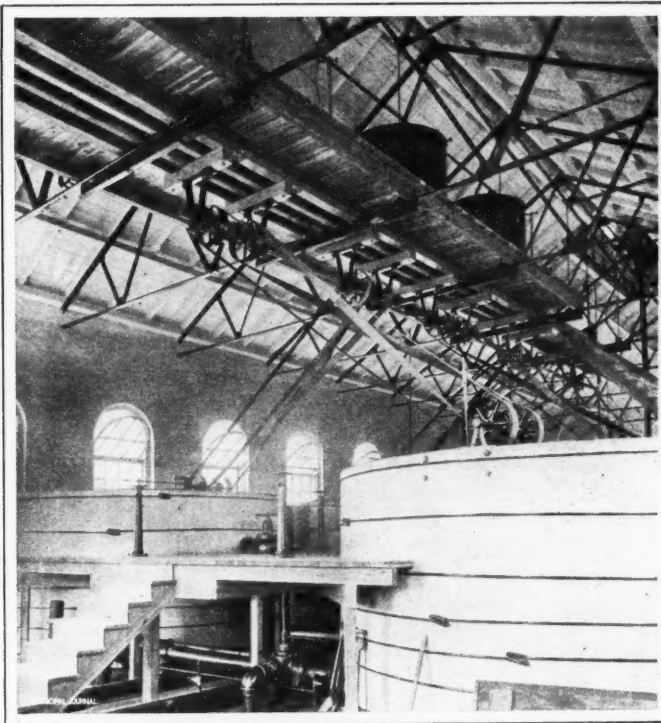


FIG. 2.—INTERIOR OF FILTER HOUSE

The plant was completed on July 5th and the official test was started July 21st and finished August 4th. During this time the filters were operated by Mr. Fred Noll, acting for the Pittsburgh Filter Manufacturing Company. The analyses were made by Dr. Ernest C. Levy, Sanitary Chemist and Bacteriologist, Director of the City Water Department Laboratory, Richmond, Va., acting for the City of Danville. Excerpts from the report of Dr. Levy to Mr. Frank Talbott, Superintendent, Water, Gas & Electric Light Department, Danville, Va., are given below:

"The last of the series of bacteriological tests of the efficiency of the mechanical filters recently installed for the City of Danville by the Pittsburgh Filter Mfg. Company was completed by me yesterday. The contract with the Filter Company calling for ten tests of bacterial efficiency, I was engaged by you to conduct this work. The first of the samples was collected on July 21st and thereafter examinations were made daily, unless, at my own request, there was some reason for a break in the work. In this connection, I wish to call attention to the fact that the samples examined by me were in no wise specially selected but represent the regular working of the filters. Moreover, no test was thrown out for any reason, the following table including every sample plated by me.

"Comparing the actual accomplishment of your filters with the requirements of your guarantee where the raw water contained over 3,000 bacteria per cubic centimeter, we get the following:

Bacteria per c.c. in raw water.	Bacteria per c.c. in filtered water allowed under guarantee of 98 per cent. removal.	Bacteria per c.c. actually present in filtered water.
8250.....	164.....	4
4600.....	92.....	0
4100.....	82.....	5
5700.....	114.....	1
7100.....	142.....	2
	594	12

"Whereas, therefore, considering these five samples together, the presence of 594 bacteria in the filtrate would have fulfilled the terms of the guarantee, the total number actually present was only twelve.

"A similar comparison for the cases where the bacteria in the raw water were below 3,000 per cubic centimeter gives the following:

Bacteria per c.c. in raw water.	Bacteria per c.c. in effluent allowed under guarantee of not over 100 per c.c.	Bacteria per c.c. actually present in filtered water.
1050.....	100.....	1
550.....	100.....	2
1650.....	100.....	8
1300.....	100.....	0
1750.....	100.....	1
	500	12

"The average bacterial efficiency for the entire series of tests was 99.9 per cent, against 98 per cent. guaranteed. Not only was the average high, but the lowest single efficiency was 99.5 per cent. and this occurred on a day when the chemical feed-pipe became obstructed, resulting, according to the statement of Mr. Fred Noll, who was operating the filters for the manufacturers, in a falling off in the amount of aluminum sulphate to probably not over half-a-grain per gallon for the time immediately preceding the collection of the samples.

"In compliance with your request, I made a test for the presence of alum in a sample of water collected from one of your regular service taps, at Clarke's drug store, and shipped

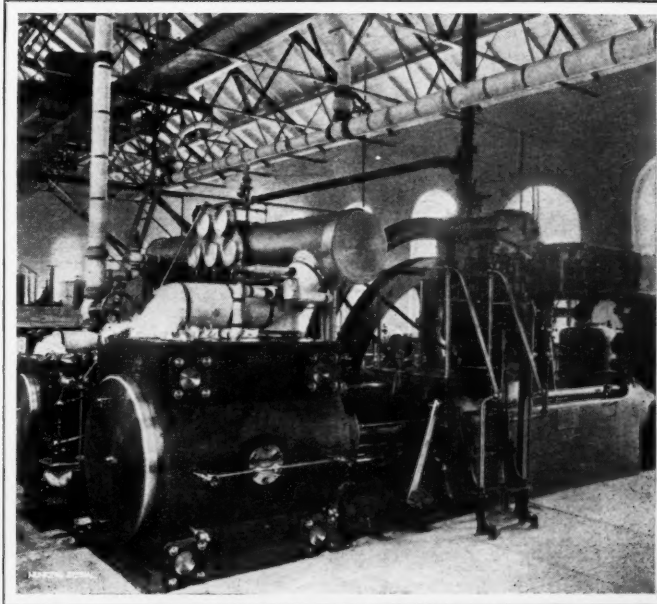


FIG. 3.—HIGH-SERVICE SNOW PUMPING ENGINE

directly to me on August 2nd. The haematoxylin test (which is sensitive to one part of aluminum sulphate in at least 4,000,000 parts of water) failed to show the slightest trace of that chemical. The alkalinity of this sample was 6, show-

ing that there could still have been added about $\frac{3}{4}$ grain aluminum sulphate per gallon without any of it passing through the filters.

"These tests have shown that your filters are capable of furnishing not only a perfectly clear water but also a water essentially germ-free."

CITY OF DANVILLE, VIRGINIA. RESULTS OF TEN TESTS OF FILTERS INSTALLED BY PITTSBURGH FILTER MANUFACTURING CO.

Date	Time of Collecting Samples.	Turbidity (Silica Scale).		Bacteria per c.c.		Bacteria Efficiency (Per cent. Removed).	Grains Aluminum Sulphate Used per Gallon.	Remarks.
1905.		Dan River.	Effluent.	Dan River.	Effluent.			
July 21	8.30 A. M.	—	0	1050	1	99.9	1	
" 22	8.30 "	—	0	8250	4	100.0	1	
" 25	9.30 "	950	1	4600	0	100.2	2	
" 26	9.30 "	550	0	550	2	99.7	1½	Alk. of raw water 13 parts per mil'n Feed from chemical tank obstructed.
" 27	9.30 "	800	2	1650	8	99.5	1½	
" 28	9.00 "	600	0	4100	5	99.9	2	
" 31	9.00 "	1250	0	5700	1	100.0	2	
Aug. 2	9.00 "	650	0	7100	2	100.0	1¾	
" 3	9.00 "	160	1	1300	0	100.0	1½	
" 4	9.00 "	130	0	1750	1	99.9	1	½ grain lime used per gallon
Average.....		636	0.4	3600	2	99.9	1½	

NOTE.—Where bacterial efficiency was over 99.95 per cent., it is given as 100 per cent.—E. C. Levy, Sanitary Expert.

MUNICIPAL OWNERSHIP SUCCESSFUL

Bluffton, Ind., Solves the Question of Public Ownership—Light and Water Plants Operated Economically—Some of the Difficulties Overcome

By John Mock, Mayor

As an earnest reader of the MUNICIPAL JOURNAL AND ENGINEER, deeply interested in the success of municipal ownership and the operation of all public utilities, it is with pleasure that I present this account of the conditions existing in the city of Bluffton, Indiana, in the hope that it will prove not only of interest to readers but of value to other municipalities.

Our city is situated at the intersection of the "Clover Leaf" and Lake Erie and Western Railways, and since September 1st, 1886, we have owned and operated our own water-works plant; if we may judge from results, this has now passed beyond the experimental stage of its existence. Municipal ownership had, years ago, been in disrepute because of the mismanagement of the water-works plant. Its failure at that time was due to local franchise seekers and careless management on the part of city officials. A brief statement of the history of this plant may not be without interest.

The first pumps were purchased by a committee and operated under its supervision for a number of years. A double set of 1,000,000-gallon Holley pumps was installed in a brick structure placed about 250 feet from the river bank, the intention being to obtain sufficient water from a well, 25 feet in diameter and 35 feet deep, to supply residents, with a river connection for use in fires. The wells soon proved to be inadequate, and a 3-inch hole, fifty feet deep, was subsequently bored in the center to increase the yield. This supply was soon exhausted and an additional well, 35 feet deep, was constructed to the east of the old well. This furnished water for a time, and in a vain hope to permanently increase the supply the pumps were lowered

ten feet into the rock, thus placing them twenty feet below the surface of the ground. After expending \$5,000 it was shown that no perennial supply could be obtained from that source.

Some years prior to this an oil company had drilled an abortive prospecting well on the site of the works to a depth of 1,200 feet. As a last resort, a deep-well pump was purchased by the city and put to work in this well. This furnished a constant stream of water from a 4-inch pipe, and nine other 8-inch wells were driven to a depth of 250 feet at a cost of \$1,500. A cross-compound 1,500,000-gallon Ingersoll air-compressor was then installed; this still runs at thirty-two revolutions per minute and gives an air pressure of 80 pounds per square inch. The original deep well, first used with a deep-well pump, was later attached to the air-compressor and soon drained the other drilled wells.

A new set of pumps of the McGowen type, with a capacity of 3,000,000 gallons per twenty-four hours, was next installed in a new brick and slate building. Three more deep wells were drilled about half a mile south of the plant and connected with the large well by means of an 8-inch earthenware pipe laid with cement joints. As thus arranged, these wells now always contain fifteen feet of clear, pure water. As they have been cleaned out and the fissures cemented, the supply now comes exclusively from deep wells worked by air compressors. Water meters have been installed on all services, the water being paid for at the rate of twenty cents per thousand gallons, and the flat rate, which had been in past years such a mill-stone about the neck of the city, has been abandoned. Apart from this, the collection of the water-works revenue was long on an un-

satisfactory basis. In former years, no exact account was kept of the water pumped, and it would have been useless to do so. Regardless of restricting ordinances, plumbers tapped mains without notice, extensions were made from services already in use, and upon investigation I learned that services registered as "wash basins," and charged at the nominal rate of a dollar a year, had been extended to water closet, kitchen and other fittings.

Some forty meters which had been purchased and placed on services were covered with mud, and in two instances with cement-sidewalk, so that repair, reading or running was an utter impossibility. About half of these meters were found so clogged up that they could not be repaired. In some cases new gearing was put in, and all are now running and registering in good order. The meter services in most instances were paying on the flat rate and some, though marked "Meter-Rate," were not paying at all. The total revenue received from the plant was less than \$3,500, while the expenses were \$8,000 per annum, taking into account the investment of \$49,000. At the present time there are 500 meters in use.

Formerly no water rental was collected from fraternal lodges or churches, but we began to charge \$15 per year for pipe organs and half-rate for all other water used, and now have them on meters.

The old pumps have been overhauled and have a com-

bined capacity of nearly 3,500,000 gallons per 24 hours. We have two "Dayton" heaters, and pump our feed-water into the boilers at a temperature of about 200° F.

The equipment for the city's electric lighting plant consists of one 160-hp. Reeves engine directly connected to a 110-kw. three-phase alternating current generator, and a similar 350-hp. engine attached to a 220-kw. generator. There are over 4,000 lights in operation, in addition to ninety lights for streets.

Turning for a moment to matters of miscellaneous municipal interest, the city has recently awarded to the Hoosier Construction Co., of Indianapolis, a contract for twelve miles of asphalt pavement at \$1.98 per square yard, the specifications calling for a 5-inch Portland concrete base and a 3-inch asphalt top. We put in ten squares of Warren Bros. bitulithic macadam last year and nearly two miles the year before, and this has stood our cold weather with no more than ordinary wear showing. Alleys throughout the business part of the city are paved with Metropolitan brick block on a 6-inch Portland concrete base.

I may sum up the situation in our city by saying that so long as our public service plants are conducted on business principles and politics are eliminated from their administration, so long will it be to the profit and well-being of the city to continue the system of public ownership which it has established in the face of so many obstacles.

PAVEMENTS AND PAVING MATERIALS*

THE better the education, information and experience of an engineer or constructor, the better he is able to build for present and future needs. Paving is a branch of engineering which, like water works and other branches, demands a knowledge of the past from study, reading, correspondence, examination and experience, to enable the engineer to provide specifications, tests and inspections, and thus produce pavements for present needs and which can be used, with a minimum of repairs, by succeeding generations. As to cost, a city has so long a life that cheap maintenance, not cheap first cost, is true economy.

The problem of what is the best pavement is a local problem for each city and for each street. It depends upon the character, traffic, grade and other elements in each case. There are streets and avenues in almost every city adapted to either gravel, macadam, telford-macadam, asphalt, bitulithic, brick, stone-block or other pavement. Local conditions and available materials must be considered.

It is the duty and privilege of every city engineer, official or other person who has to do with street paving to use the recorded, valuable and accessible experience of many cities in Europe and America in laying and maintaining pavements. They should use, or cause to be used, the well established preliminary chemical and especially physical tests of paving materials, based upon practical and concurrent experience with past pavements of all kinds. We thus avoid past failures and repeat former successes

After referring to the pavements of ancient Rome, the early efforts of French engineers and the work of Telford and Macadam, the paper proceeds to the introduction of asphalt paving, in 1854, when the Rue Begere, Paris, was paved with that material by the French engineer, Leon Malo, "the father of asphalt pavements," and continues:

The asphalt pavements of Europe, with a very few late exceptions, are natural bituminous limestone. It was in 1871, in Newark, N. J., and finally, in 1876, in Washington, D. C., that the American artificial, asphalt mixture pavements took their start, being composed of about 90 per cent. of sand, etc., cemented together with about 10 per cent. of asphalt-cement (asphaltum and bituminous flux). These artificial mixture pavements depend for their success, possibly more than any other kind of pavement, upon extensive preliminary chemical and physical tests of their component materials, combined with experience. Tests of asphalt, sand and other parts of asphalt pavement mixtures, full technical specifications and inspection of construction are more necessary than ever because there are now many good competing asphalts. These tests must not be made by nor indicated, as is too often the case, by any man in the regular employ or controlled by any one asphalt interest. The tendency is to use purer and better asphalts; especially those not seriously affected by water. I have had occasion, during the past two years, to examine sixteen good asphalts from as many independent sources.

Wood pavements, used under constant conditions of moist climate, uniform traffic and constant repairs, have been i

*Paper (condensed) read before the American Society of Municipal Improvements Convention, held at Montreal, Canada, September 5-7, by Mr. J. W. Howard, Consulting Engineer on Pavements, New York City.

use in London for more than forty years. Of course many of the wood blocks are often replaced and all of them every three to seven years. Wood pavements, as a whole, especially in our wet and then dry American climate, have been failures. Nevertheless, there are a few streets of a few cities where wood pavement, properly laid and maintained, will be a luxury worth its cost. It is wise to know the history and necessary to use the preliminary tests of wood paving materials, and to have full specifications, to insure even approximately good results.

The rise of brick pavements began by small experiments between 1870 and 1885. Their increase during the past fifteen years has been large, there being now about 168 makers of paving bricks in the United States, producing many sizes and many qualities. Most of them are suited to only the lightest traffic. There are a few shale bricks, however, which will bear fairly heavy traffic and are suited for some streets in many cities.

Brick pavements are a class demanding strict preliminary tests to secure sure results; brand will not do it, as even a brand varies at times. The principal tests are abrasion, cross breaking, water absorption, density, hardness, and crushing, with those for free lime, potash, etc., presence of cracks, uniformity of shape, material, etc. Paving bricks which pass definite standards and methods of tests will make good pavements for certain streets in many cities.

Another class of pavement is what is called tar-macadam. It is being experimented with in a few English towns and in some Canadian and United States cities with light traffic. No definite mixture of tar nor quality of tar and stone or gravel is used. Each place or company is trying its own mixture, sometimes calling it tar, bituminous or even asphalt macadam.

A special pavement, called bitulithic, made of selected and prepared tar products or bituminous cement combined with graded crushed stone, etc., began its rapid rise five years ago, being the result of examination of past experience, laboratory research and experiments. The theory and practice of bitulithic pavement is one of dependence for its good results upon preliminary tests of materials and pre-determination of mixtures, combined with rigid inspection of work in progress.

Without discussing granite and other pavements, not enumerated, sufficient has been said to indicate the importance of using standard, scientific, chemical and physical tests, and examination of all paving materials previous to and during their use in pavements. The custom of certain cities relying on pavement guarantees and bondsmen is a bad one. No such method is found in European cities; nor is it used for public buildings, bridges, waterworks, etc., in the United States. A street needs a good pavement, not a good bond alone.

AN EXPERIMENT AND AN EXPERIENCE IN SEWAGE DISPOSAL*

In the year 1880 the township of East Orange (now a city), New Jersey, had a population of 8,300 and an area of four square miles. Two small hat factories comprised its manufactures. It was a purely residential community, largely for business men in New York City.

Its position as to drainage is on a divide which runs through and almost bisects its area.

The characteristics remain essentially the same to-day as then, except that it now houses 26,000 people on its four square miles.

In 1882 a water supply was furnished the township by an incorporated water company and it soon became evident that wells and cesspools were doomed, the one as a source of supply, the other as a disposal of waste. To reach tide-water, the Passaic River appeared to be prohibited, and local disposal seemed to be the only method which could be used. Plans for local disposal were prepared in 1886.

The plans provided for buildings in which settling tanks and proper machinery for handling sludge were to be placed, and about twenty acres of thoroughly drained land, over which the treated sewage (after having been relieved of practically all solids by chemical precipitation) was to flow. The effluent from the under-drains, which ran into a large stream, was expected to be pure water, and so, for a while, it certainly was.

Two series of three settling tanks each were provided, and alternately one series to run about two weeks while the other series was being drawn off, the sludge gathered, strained and pressed.

It was expected by the Engineer whose plan was adopted that the expense of running the disposal works would be largely, if not entirely, met by the sale of the pressed sludge for fertilizer. It took but a few weeks to demonstrate that the farmers of outlying townships were not only unwilling to pay for pressed sludge, but rather demanded pay for taking it away, and, later, to refuse it altogether, because they had satisfied themselves that its fertilizing value was almost nil. The result was that, for the first three years, the average annual cost of maintenance of the plant was \$11,000.

Rosy reports were made each year of the increasing efficiency of the plant, owing to better methods being introduced for the running of the plant, but each year the appropriations asked for maintenance grew greater, while the people in the immediate neighborhood insisted that objectionable odors could be noticed, and that under some conditions of atmosphere they were unbearable. Values of real estate dropped, and it became impossible to make real estate deals within the odorous radius; further, the neighboring townships, through which the stream bearing the effluent sewage ran, found something wrong with the stream, protested vigorously and insisted that other means should be obtained to dispose of the sewage. In fact, their insistence was

* Paper read before the American Society of Municipal Improvements Convention, held at Montreal, Can., September 5-7, by W. H. V. Reimer, City Engineer, East Orange, N. J.

so thorough that, rather than face an injunction from the court preventing the use of the plant, the offending township was forced to seek other means of disposal.

Not only did the warning of the court force this conclusion, but it was duly reported to the citizens that at least \$20,000 would be required for the coming year to run the plant with any degree of success and decency, with the prospect that each succeeding year would require increasing appropriations.

The question here arises, Was the installation of this disposal plant an experiment? Engineering advice before it was built said no, the plant was all right; in England, France and Germany such plants were working with success, and this should do its work also, but it did not do it.

Few people realize what it means to make from 1,700 to 2,600 tight sewer joints to the mile in shaky bottoms, or in the ground, where the sewer is laid below the general water level.

Just what might have been the result if some other method of disposal could have been secured is of course problematical, as seen from this time, but to have been enjoined from the use of the plant would have placed nearly 20,000 people in jeopardy of their health, and probably have hindered the growth of the city beyond measure.

I believe that the main difficulty, and the one which it was almost impossible to overcome, after the sewer had been built, was the excess of ground-water which found its way into the sewers, with the result that the disposal plant could not carry it.

I am satisfied that the sewage itself did not amount to half of the volume which was poured into the tanks; consequently, the tanks could not hold their contents long enough to secure a thorough settling of the solids and allow the

chemical action necessary to purify the water before it left the tanks to overflow the ground. The result was that the overflow from the tanks was almost invariably foul, and the odor could be detected within a quarter of a mile of the disposal grounds, providing the wind was from the grounds toward any given quarter.

I believe the plant would have been a success if three conditions looking thereto had been carried out. Two of them were almost vital, the other largely helpful. Of the two, the practical elimination of the ground-water comes first, a metered water system second, and a thorough system of surface and storm-water drainage to supplement the other two. That the elimination of the ground-water is vital you all undoubtedly agree; that a metered water system would have largely reduced the waste sent into the sewers we know from experience from other places where it is used.

That the ground-water was the main difficulty is more apparent to-day than in the first years of the system, for to-day much of the ground through which the valley lines were run has been drained to such an extent that the water furnished to the sewers is much less than formerly, and to-day, with a population of 26,000, the main outlet now running to tide-water is carrying scarcely 10 per cent. more flow than when first put in use, at which time the population was about 16,000.

If to this reduced flow of ground-water there could be a still greater reduction by the use of meters we would probably find that there would not be more than one-and-a-half millions of gallons of sewage per day to be disposed of. This amount could have been handled at the disposal plant with comparatively little difficulty, and, as the amount normally increased, other land which had been acquired, but which had not been prepared, could have been put in use.

FIRES IN CROWDED STORES*

THE tendency of the times in all our cities is to build very large department stores, and in case of fire occurring when the store is crowded the danger is very great.

The first danger that comes to my mind arises from the architectural defects caused by insufficient or not rigorously enforced building laws, which is the great handicap a Fire Department has to contend with. Under this heading the great menaces are insufficient number of and poorly placed exits, insufficient number of and narrow wooden stairways not continuous from floors above the first. Elevators not in fireproof encasements. The area of floor spaces much too great. Aisles, insufficient number of, not wide enough, badly placed and obstructed; escalators and revolving exits.

Danger from these sources may be greatly lessened by obtaining from your legislature building laws to cover the defects named, and these laws, once obtained, must be stoutly defended, as interested parties are continually knocking at the door of the legislature to change laws that are a

handicap to their plans. Building laws, to be of any consequence, must be strictly enforced, another task, as efforts are continually being made to evade them or they are scanned very closely with the hope of discovering some loophole of escape from their requirements.

These evasions can only be discovered by a system of building inspection zealously carried out, then compel owners to rectify at once and danger will be lessened.

Our Fire Commissioner has recently inaugurated a card system of building inspection. The records are in charge of the different District Chiefs and kept in their headquarters.

Each building in our city has its card, and opposite the different designations printed on this card are the conditions found by the officer on date of inspection. It can be readily seen that any additions or alterations between dates of inspection can be readily noted, and another advantage is that the officers become very familiar with the building, its good and bad features; in the event of a fire this is invaluable knowledge for the extinction of fire and prevention of loss of life.

* From a paper read before the Massachusetts State Firemen's Association Convention, held at New Bedford, Mass., September 27-29, 1905, by Chief W. T. Cheswell, Boston.

Another source of danger arises from the sale of explosives, such as fireworks, oil, gasoline, acetylene, etc., and the highly inflammable nature of most goods carried in stock, which would greatly accelerate the speed of the fire, and of course the greater the rapidity the less time to get out, and consequently more probable fatalities. Such explosives should constitute an isolated department if carried at all, and every attention paid as the law demands.

Restaurants are a great menace, for as a rule incipient fires are continually happening in the kitchens. If permitted at all, these kitchens should always be maintained on an upper floor; better the top. Department stores in our city are equipped with laundries, another liability which should be vetoed or isolated and carefully watched.

A great and important source of danger is the remarkable accumulation of riff-raff in these large stores. This rubbish is highly inflammable, and great care should be taken to prevent such accumulation, and also in the disposal of it. A good scheme is to be adopted in a large department store recently erected. "Starting at the seventh floor and extending to the basement is a chute which carries every sort of rubbish from every floor to the basement, where it is burned in a furnace built expressly for the purpose. By this innovation the floors and counters are kept constantly cleared of waste paper, excelsior, packing material and all such inflammable waste."

While all modern appliances for extinguishing fires are excellent in character, the main idea should be to use every sort of precaution to prevent fires from starting, and to this end, in all large stores, there should be a watchman on every floor, constantly on duty, never relaxing vigilance unless relieved by some other. In this way every nook and corner of the building is continually being scanned. These watchmen should be thoroughly drilled what to do in emergency so as to act quickly and above all without excitement.

Right here I want to say a few words about fire brigades

established and maintained in most of our large stores. The management is to be commended for the display of good will and eagerness to assist in fire fighting; the equipments are usually very complete and the rules apt to be very iron-clad in regard to discipline, but my humble opinion is that the most important teachings to these departments would be, in the case of the discovery of a fire, to know the exact location of the buttons and how to properly give an alarm; station somebody to notify the officer in charge of the first piece of apparatus arriving on the ground as to the exact location of the fire, and then, if needed, to assist under the directions of officers of the Department who are trained in their work and know how to extinguish fire with celerity.

And now we come to the greatest danger of all, the crowd and its vagaries that in time of danger make it uncontrollable and its moves unfathomable. If some man or men could invent some method to insure a crowd against panic an invaluable discovery would be made and in every phase of danger life would be more secure.

In my many years in the Fire Department I have seen life in danger in a great many different situations, and I have had the many different ways which men, women and children act when threatened with extinction sunk into my memory so deep as never to be forgotten, and I therefore dread this source of danger in case of a fire in a crowded store more than any other. It is surprising, if unaccompanied by panic, how quickly a building of this nature could be emptied, almost as rapidly as a theater; three different theaters in our city, each containing an audience of at least fifteen hundred people, were timed and three minutes is the most that elapsed in any case before the house was empty.

In conclusion, I want to say that very few lives are lost in these crowded stores by the actual contact with fire unless accompanied by explosions. The records will show that even in the case of the Chicago Theater catastrophe, of the 562 lives lost only a few gave evidence of death by fire.

HOW TO REDUCE THE FIRE HAZARD

By M. G. Reeves

MUNICIPALITIES very often discuss the "fire hazard," and naturally so, as every public official is deeply interested in the safety and security of the records and documents in his care. To properly house them is the theme of frequent discussion, and, in one respect, at least, the solution is comparatively simple: use steel for interior furnishings.

The public buildings which are being erected to-day have as a basis of construction stone, steel and cement. The walls are almost as solid as the rock of Gibraltar, but a few will contain wooden furnishings and wooden devices, inflammable material. The question arises, how can the fire hazard be reduced? The answer is, cart away your wooden equipment to the woodpile, tear up your cardboard document files, remove your wooden shelving and equip altogether with steel.

Insurance statistics show that most fires originate within buildings. The walls of cement and stone shield the building to a great extent from exterior fires, but inflammable furnishings invite destruction. It is proved by figures show-

ing the destruction of public buildings during the past twenty-five years that even fireproof buildings will burn.

Who is to be held responsible for dilatoriness in adopting steel? In my opinion it is the "powers that be." Short-sightedness may come through the Commission in charge of the plans or erection, or it may come through the public official who just keeps putting off the use of steel equipment until the fatal moment arrives, and then, when the building is enveloped in flames and the furnishings and records and documents are going up in smoke, it is too late to think of their safety. This ought to have been done long before, either when the structure was being erected or soon after.

A public building may be solidly erected and provided with all the appurtenances for security and safety exteriorly, but if the interior is equipped with inflammable material, the danger is none the less apparent. Exterior fireproof construction, combined with indestructible interior equipment, forms a barrier to the most dangerous flames. Steel equipment is not so much an agency of protection as prevention,

For instance, suppose a fireproof building, so-called because of its exterior construction of stone and steel, contains wooden furnishings. An incipient fire ignites the woodwork,



COMBINATION STACK IN OFFICE OF SEWER COMMISSIONER, CITY HALL, ST. LOUIS

communicates with the records and documents and everything is a mass of flame. Of what advantage are fireproof walls? On the other hand, suppose the interior of a fireproof building is equipped with indestructible material, steel. A fire breaks out; steel will not burn and the flames are checked. The element of protection or prevention is apparent; the records, documents and buildings are safe.

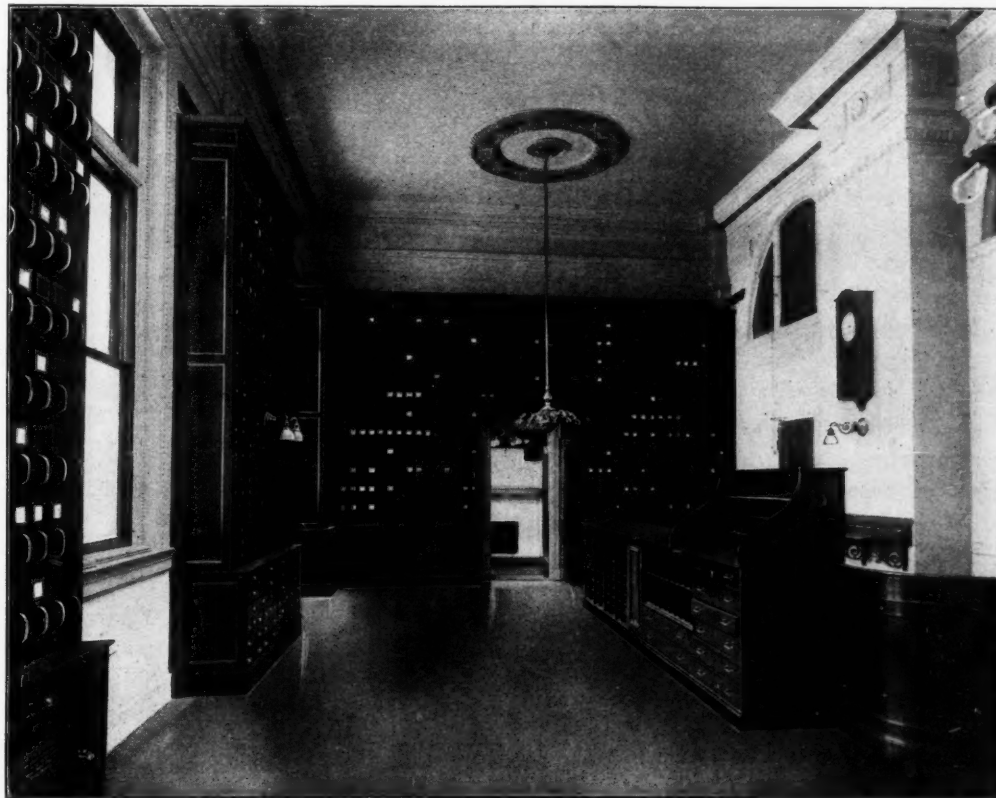
For the proper protection of official records and documents the following devices, all tending to the lessening of risk, are furnished by the manufacturers of steel equipment: steel roller shelving, document files, card indexes, plain steel shelving, curtained cases, cupboards, counters, partitions, book drawers, tables, book stalls, deposit ticket files, vault omnibuses, wardrobes, lockers, roll-top desks, flat-top desks, sectional cabinets, steel counters, etc. With these numerous productions, or a judicious selection of them, a building can be rendered nearly fireproof at the present time.

I recently visited a public building in one of the large cities and saw records of the most valuable nature lined along wooden shelves, exposed to elemental action and more than the ordinary wear and tear; priceless documents were contained in cardboard boxes; the furniture was old and dry and of the most inflammable character. Is it a wonder that so many public buildings and their contents are destroyed? The following is an authentic list of public buildings destroyed during the past twenty-five years, not including some of very recent date: 34 State-houses, 723 courthouses, 1,960 city and town halls, 1,424 banks, 163 public libraries. This list does not include the destruction of the State capitols at Des Moines, Ia.; Madison, Wis.; the courthouses at Wataska, Ill., Liberty, Ind., Waynesville, Mo., Brighton, Colo.; city halls at Marlboro, Mass., Wilmington, Del., Stamford, Conn., Meriden, Conn., or any of the public or semi-public buildings destroyed in last year's great fire at Baltimore.

Who pays the cost? The taxpayer. Is his censure often uncalled for? He can at least claim that it devolves on the public official himself to see that he is furnished with "precautionary" equipment or indestructible devices for the proper protection of his tools of business. It is true, no doubt, that the first cost of steel furniture is more than that of wooden equipment. But what of that? A steel constructed building costs more than one of wood; a brick house costs more than a frame one; the idea is protection. The safety and security of our public records are surely not to be disregarded because of the cost of this item.

It is the duty of the Commission in charge of public buildings, and of the public official in whose charge these valuable records are, to adopt the right kind of equipment.*

* Illustrations used by courtesy of Berger Manufacturing Co., Canton, O.



FILE ROOM IN SAN FRANCISCO COURTHOUSE, EQUIPPED WITH STEEL FURNITURE

MONTREAL'S MUNICIPAL ASPHALT PLANT*

THE defective condition of many of our asphalt paved streets rendered it absolutely necessary that the City should be in a position to control the situation without being at the mercy of the contractors. In the spring of 1903 the City Council authorized the Roads Committee to call for tenders for the supply and erection of an asphalt plant and complete equipment. The tender price of Messrs. Warren Brothers, of Boston, namely \$13,000, was accepted, and the contract awarded in April, 1903. The plant was installed and operations were begun in June of the same year.

The plant's capacity is 1,000 square yards of 2-inch topping per diem. The following is a general description of the plant:

The sand dryers consist of double 40-inch cylinders of 19 feet 6 inches length, provided with an exhaust fan for furnishing induced draft. These dryers are self-contained, having a steel casing and a double steel roof with an air space between to prevent loss of heat by radiation. The inside of the casing is lined half way back with special extra heavy fire bricks and the dryers are fitted with grates having an area of 40 square feet. The dryer is so arranged that the heat passes around the outside of the cylinders and then back through their interior, which allows the heat to come into contact both with the steel shell and through the sand itself, which is kept constantly dropping through the hot gases. The hot sand is elevated by means of a continuous elevator to a revolving screen which can easily be shifted out of the way in case it is desired to run binder.

The bin and mixer are compactly arranged so that the hot sand or stone can be drawn by gravity into the weighing box, and from there into the mixer, without having to handle it in any other way. The mixer is elevated so that the teams can back without hindrance.

The whole structure is built of steel, with the exception of the floor, thus securing a perfectly rigid structure which is not affected by shrinkage.

The two melting tanks hold 1,400 [Imp.] gallons each. A most important feature of the plant is the independent trackway which carries the asphalt bucket, by reason of which the jarring and vibration of the machinery is entirely eliminated from the delicate scales on the asphalt bucket, making it possible to weigh accurately the asphalt for each batch. The power is supplied by a 35-h.p. engine. The engine and boiler are mounted together in a room separated from the rest of the plant, so as to avoid damage from dust.

The apparatus supplied by the contractors for the purpose of collecting the dust did not prove to be satisfactory on account of the large quantity of dust which escaped with the smoke. This dust caused a great deal of annoyance to the workmen and residents in the neighborhood of the plant. In order to overcome the difficulty, the engineer in charge, Mr. N. Cyr, devised and built a steel dust collector, which effectively prevents the dust from escaping, and works in a

very satisfactory manner. The original dust collector was enclosed in canvas, and the improved dust collector referred to above is made of steel, and the dust and smoke are led into a tank of water where the dust is precipitated by contact with the water.

In addition to the tools necessary for the operation of the plant, the contractors were required to furnish the following tools for street paving purposes:

- 1 five-ton steam asphalt roller.
- 1 fire wagon.
- 1 pitch kettle.
- 6 asphalt rakes.
- 6 asphalt tampers.
- 6 asphalt smoothers.
- 3 double-eye asphalt cutters.

The whole work of erection was completed in a first class manner by the contractors, and the repairing of asphalt pavements immediately started by the City.

The entire plant, with the exception of the engine and boiler, is under one roof, and the building is quite large, wherein ample quantities of raw material are kept on hand. The City has since acquired an additional melting tank and duplicated all the above tools, and keeps two gangs of men.

During the first two seasons there were 51,080 square yards of repairs and new work done by the City; the new work consisted chiefly of repaving streets, formerly paved with 3-inch tamarack blocks, which were worn out. The average cost of the asphalt laid was \$1.22 per square yard, and this figure includes all works in connection therewith.

When the asphaltting work is suspended on account of wet weather the old asphalt taken from the streets is ground in a mill and prepared for use in the construction of coal-tar composition sidewalks, so that no time is lost.

The City is this year making experiments with different brands of asphalt, and hopes by next year to be in a position to determine which kind of asphalt is best suited to the conditions of our climate, and also to be able to ascertain the area that a ton of each kind will cover, together with the cost per square yard.

The total cost of the civic asphalt plant, including buildings erected in the Corporation yard, tools, repairs, etc., has been to date \$22,881.35.

The approximate total area of pavements of all kinds in the City is 745,223.75 square yards, or 31 1-3 linear miles. Two-thirds of this is now under the City's charge for repairs, and the balance is still under guarantees which expire yearly up to 1910.

In view of the fact that the City now has more than 500,000 square yards of permanent ways to keep in repair, the importance of possessing adequate means to maintain the streets in good repair cannot be exaggerated, and the results obtained with the civic asphalt plant have amply justified the expenditure the venture entailed, as not only has the work been done more economically and promptly, but it has been done in a more thorough and satisfactory manner than when done by contractors.

* Paper read before the American Society of Municipal Improvements Convention, held at Montreal, Can., September 5-7, by John R. Barlow, Mem. Can. Soc. C. E., City Surveyor of Montreal.

VOLUNTEER FIRE DEPARTMENTS

THE growing recognition of the value of properly organized Fire Departments in communities unsuited, by a variety of reasons, for the formation and maintenance of organizations on the lines familiar to large cities, give added point to the following address, delivered by Fire Chief Frank Manley, of Dalton, Ga., at the recent Convention of Fire Engineers at Duluth, Minn. We extract it from "The Firemen's Herald" of September 30th:

The first thought that came into my mind on reading the caption of this topic was of Miss Becky Sharpe, Thackeray's interesting and versatile heroine, and the life-long problems that so sorely vexed her, "How to live on nothing a year."

How to organize and maintain an effective volunteer fire department on the scanty support that it too often receives is a proposition that demands all that any man has of fortitude, tact and unselfish hard work. It is a many-sided proposition, too, on which nobody has yet said the last word, nor can any hard and fast rules be set down that will fit every locality and every department, as varying conditions require different policies as to numbers of men, the character and distribution of apparatus and the internal government of the department.

There is a vast difference, however, in the work of volunteer departments, and there must be some assignable reasons for the difference. There are all over the country plenty of volunteer departments that are as prompt, reliable and efficient as any similar paid force. On the other hand, there are many that come to life only when the fire alarm rings and then, although not lacking in intelligence or patriotism, go to pieces for lack of method and discipline, and the boys have a hard time of it next morning trying to plausibly explain "how it happened." Speaking broadly, the one is organized, systematized; the other is not.

For the very best volunteer service I would personally prefer every time the small department. Twelve or fifteen men to the company is more than enough. Twenty-five wide-awake, active firemen in a town of five to six thousand people is an amply large roll to handle any ordinary bad fire and can readily be made twice as effective as a much larger and more unwieldy force. The small, compact department has another important advantage in that the Chief and other officers know each man and what he can do. The members can not only be selected with greater care, but can better and more quickly learn the expert handling of hose, ladders, and other apparatus. Learning to explicitly obey orders is the snag on which perhaps more volunteer departments fall down than any other. It is the hardest thing in the world to hammer into the volunteer's head the supreme importance of doing at a fire exactly what he is told to do by his superior officer and of keeping at that same thing until directed elsewhere. Fortunate indeed is the volunteer Chief who has half a dozen absolutely dependable men who he knows will stay where he puts them and who cannot be diverted from their appointed task by the yells and entreaties of an excited crowd. At a dangerous and busy fire somebody of course must take the reins and some plan must be

followed, and any plan consistently worked out is better than to tinker at half a dozen. It is, for the same reason, unwise for the Chief to give orders indiscriminately. His orders should, wherever possible, go through the company captain or foreman, as he is the man who is in the thick of the fight, who knows best his men and their capacities and whose business it is to see that his own orders to his men are executed. The volunteer Chief cannot, of course, enforce anything like perfect discipline. It is all nonsense to talk about treating the volunteer exactly the same as the paid fireman. As long as human nature remains as it is, the volunteer Chief must count good humor, tact and personal popularity as his chief asset in handling and directing his Department.

Another hard problem that confronts the volunteer Chief is to keep up interest and enthusiasm, especially when fires are infrequent. The library and reading room theory is popularly supposed by those who haven't tried it to be the thing. This probably is all right if the Department is able to maintain a pool and billiard room, gymnasium, baths and other conveniences that make the place attractive. But the vast majority of volunteer departments are not literary societies and have not the funds to build or equip attractive and inviting headquarters. If fires occur every week or so there is no trouble in keeping the Department up to the mark, but it is the long waits between fires that dull the edge of enthusiasm and which must be filled in with something to keep up interest. The first thing for a newly organized Department to do is to join as a Department the nearest volunteer firemen's association and attend and participate in its tournaments, or if none is near enough to make this practicable, organize a small association among the half dozen or so near-by towns and hold an annual tournament in some one of them each year. The months of practice drills for these contests are of inestimable value to firemen, developing the best energy, nerve and skill in the Department, bringing out newer, quicker methods for handling the apparatus and redoubling the interest of everybody, firemen and citizens, in the Department. I happen to be Secretary of one of these small associations, "The Georgia-Alabama," organized in Dalton ten years ago, which for geographical and financial reasons could not well take in more than some six or eight adjacent towns. Small as it is, however, there has been no more successful association in the country. Its tournaments have been very harmonious and enjoyable and its track records, many of them, within a fraction of a second of the best in the country. The intense rivalry between the towns of this small association has resulted in vastly better equipment and a quicker, more intelligent and more effective service for each one of them. After a successful tournament contests are always easily arranged at home between rival companies for annual inspection, Fourth of July, Labor Day and other special occasions. In fact, on all such occasions the Fire Department is the logical organization in every town to stand for and lead off in high grade athletic sports of every kind. A good, fast firemen's baseball team is worth

a whole Carnegie library in creating and maintaining team enthusiasm. Atlanta's firemen's drum and bugle corps is the best advertisement the Gate City ever had and is as popular abroad as it is at home. They do whisper it, too, down there that a smooth baseball twirler or shortstop sometimes gets a job in the Department headed by our gallant President, and it is all right. It ought to be so. The two go together. The nerve, agility, energy and intelligence required to make a baseball player are just the qualities of the best fireman.

Many volunteer departments have a hard time getting the necessary equipment to do effective work. This ought not to be so, and I believe need not be so if the matter is handled in the right manner. The fact is that the work of the volunteer fireman is but the active recognition of a public duty that every intelligent and able-bodied man owes to his community, and no man is doing his whole duty as a citizen until he has tendered his services to his local fire department. Upon this high plane of unselfish and gratuitous public service it is not right or proper for the volunteer fireman to be too modest in his demands for such equipment as will make his work efficient, and when his demands are made with firmness, reason and judgment, they will rarely be turned down. It is a very easy thing for city councils to get into the habit of giving the volunteer Department whatever in reason it asks for and it is just as easy to get into the habit of refusing necessities on the grounds of economy, etc. The Chief should be careful from the very first to never be permanently turned down on anything he officially asks for. City officials generally wish to be friendly and liberal to the Department, and if its needs are explained to them individually and privately, the lack of equipment shown, the benefits of the desired appliances made clear, there is usually little trouble in getting what is needed. I do not believe in "carrying the big stick" too conspicuously displayed. At the same time, there is no harm in having it clearly under-

stood all around that the Fire Department always expects to have its reasonable requisitions granted or an excellent reason given why they cannot be.

It is perfectly proper for the Fire Department to select from the Board of Councilmen the best man for Chairman of the Fire Committee and to request of the Mayor that he appoint him to that office. If the Mayor views the matter in the right light he will gladly follow the wishes of the Department, as they clearly have the right to name the Chairman of this Committee, with whom they have to do.

As to the management and control of a volunteer Department, it is just as essential for the Chief to be absolute in command as in the case of a paid department. Nothing will demoralize a department more quickly than the interference of well meaning but mistaken city officials. Where drivers are employed no sort of discipline is possible with a divided authority. They should be employed and discharged solely by the Chief without the interference even of the Chairman of the Fire Committee. The Chief should also have the power given him by the Department to suspend any member, without company action, for disobedience of orders at a fire. He is given special police power by most cities and should not hesitate to use it when the occasion arises.

To sum up my idea of an ideal volunteer fire Department: A small Department of picked men, personally known to the Chief and other officers. These men to be practiced in contests and drills until perfectly familiar with all of the apparatus and taught that a fireman's first duty is to obey orders. A strong Department and team pride that will not stand for defeat on the track or at a fire, and that will stand by its colors to the last ditch. With such a Department, headed by competent officers, and backed as it is sure to be by a liberal city policy, there is no such word as fail, and there is nothing finer, nobler, manlier and more worthy in all the world.

INDIANA'S MUNICIPAL CODE

IN assuming the task of framing a new municipal code of government for the municipalities within her borders, the State of Indiana was fortunate in having at hand a good working model in the city charter of Indianapolis, the capital city, which had done good service from early in 1891 and which would have remained in force but for a provision of the new code, bringing all municipalities under its operation in April of the present year. Previous to that date, the State had suffered, as others before and since, from the diversity of legislation having its origin in an excessive veneration for the principle of Home Rule, and the root motive of the new code was largely the desire to remedy defects inseparable from local initiative thus carried to extremes.

The guiding principles and machinery of the code are explained at length by Mr. H. O. Stechhan in the October-December "Forum," the following paragraph conveying a fair idea of the thoroughness with which the work has been gone about:

"The municipal code embodies the federal plan of government. In adapting it to city needs there have necessarily

been some departures, but the fundamental principles have been preserved and the functions have been separated into three divisions—the executive, legislative and judicial—very much after the manner outlined in the National Constitution. The scheme is comprehensive, and its strength lies in its simplicity. The code is written in direct language and is stripped of technicalities and legal phrases as far as it is possible for such a document to be. Complexity has been avoided, and so far no conflict of powers has been encountered. At the head of the executive department stands the Mayor, who is elected by the people for a term of four years. He is not eligible to succeed himself. Heretofore, all municipal officers in Indiana have been chosen for two years, with no limit to the number of terms. As experienced in other places, there was a constant temptation to play politics, to the end of securing re-election. This did not always protect the interests of the people. Moreover, the two-year term was too short for a mayor to learn how to do things and to get them done."

The position given the Mayor by the code is such as ought

to render that office acceptable to the best class of citizens and thus assist in securing efficient administration of its remaining provisions. Not only is he made responsible for the enforcement of the law but he also exercises a general supervision over subordinate officers and appoints the heads of all departments (that of assessment alone excepted) and has the power to remove them within certain limitations. These departments are six in number, covering respectively public works, public safety, public health and charities, law, finance, and collection and assessment. The head of the last named Department is the City Treasurer, elected by the people except in the case of municipalities that are county seats, which can call upon the County Treasurer to act. "This arrangement is a part of the State's general tax machinery, and as the duties are very much alike, they have been combined to simplify matters and in the interests of economy."

The Board of Public Works consists of three commissioners named by the Mayor, not more than two belonging to the same political party. It controls the services of a City Engineer, likewise appointed by the Mayor, and through him executes the greater part of all public improvements. Far-reaching powers are given the Board, property owners—even a majority—being powerless to defeat a sewer resolution by remonstrance if the work is deemed a public necessity by the Board. On the other hand, it cannot order a street improvement the cost of which exceeds one-half the aggregate tax valuation of the property, exclusive of permanent improvements on it, subject to assessments. The Board can condemn land required for city purposes, has charge of all real and personal property belonging to the city, and must approve all city plats, as well as those four miles beyond the city limits. On it also devolves the duty of street maintenance, the construction and operation of public utilities, and the control of public-service corporations using the streets.

The Board of Public Safety is similar in composition. Among other duties, it controls the civil-service or merit system under which the fire and police forces are recruited, a feature of this being that no more than half of either force may be chosen from one political party. Both commissioners and employees are prohibited, under heavy penalties, from participating directly or indirectly in politics.

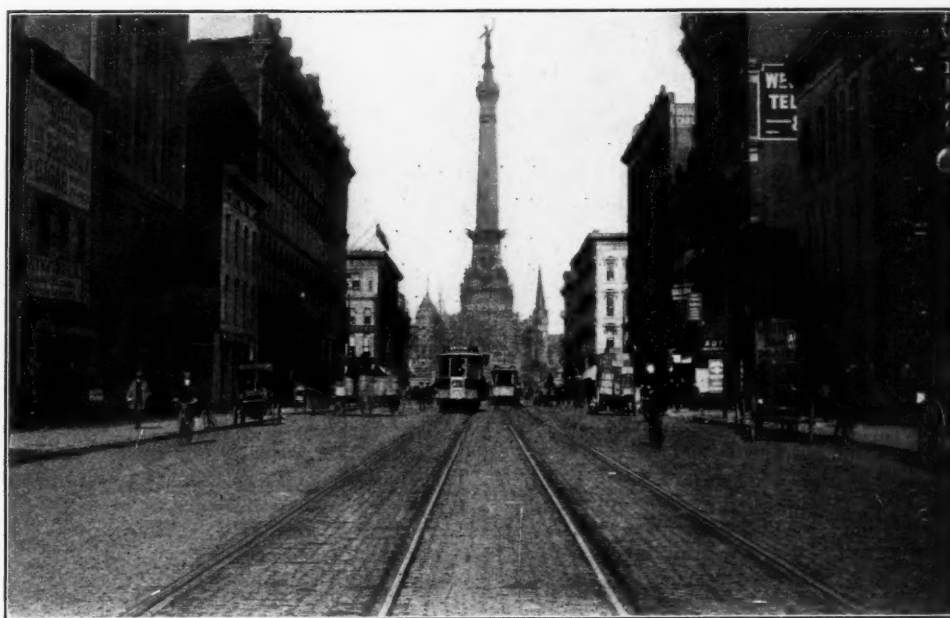
The Board of Public Health and Charities consists of three doctors chosen by the Mayor under the same restrictions as the others. They appoint a "Sanitarian," who acts as Secretary to the Board and is charged with the enforcement of all laws and ordinances pertaining to health. Some of his other duties are indicated elsewhere in this issue of the *MUNICIPAL JOURNAL*, in an article describing the municipal laboratory of Indianapolis.

The City Controller, appointed by the Mayor, presides

over what is known as the Finance Department, acts as auditor and approves all allowances made by other branches of the city government. He has charge of everything pertaining to the city's bonded debt, the municipal borrowing power being limited, by the State constitution, to 2 per cent. of the taxable value of a city or town. He prepares the civic budget, including recommendations both as to expenditure and the means of meeting it, and while the Council may effect decreases in the amounts it cannot increase them. No appropriation can be made without his approval, and a two-thirds vote of the Council is necessary for favorable action.

The Law Department is presided over by the City Attorney, appointed by the Mayor, his duties and limitations being of the usual character.

A special provision in the case of cities having more than 45,000 inhabitants provides for an auxiliary Department of



MERIDIAN STREET, INDIANAPOLIS, LOOKING NORTH

Public Parks, composed of four members appointed by the Mayor, the term of one member expiring every year. The term of appointment is four years and not more than two members may belong to the same political party. In the case of all other Boards, the terms of the members end with the administration that appointed them.

In line with the prevailing tendency, the municipal authority is a single chamber body. Each ward is represented in it by one member, and the whole city elects one-half as many members-at-large as there are wards. A veto power is vested in the Mayor, a two-thirds vote of all members being required to carry a measure not approved by him. The code enters at length upon the powers to be exercised by the municipalities, in which connection it is important to note that the latter are divided into five classes, according to population, and that varying degrees of power are accorded the different groups. "As the municipalities become smaller, there is a telescoping of powers, because the demands are not so extended as to require a form of government so highly developed."

"The Mayor's power of appointment concerning the mem-

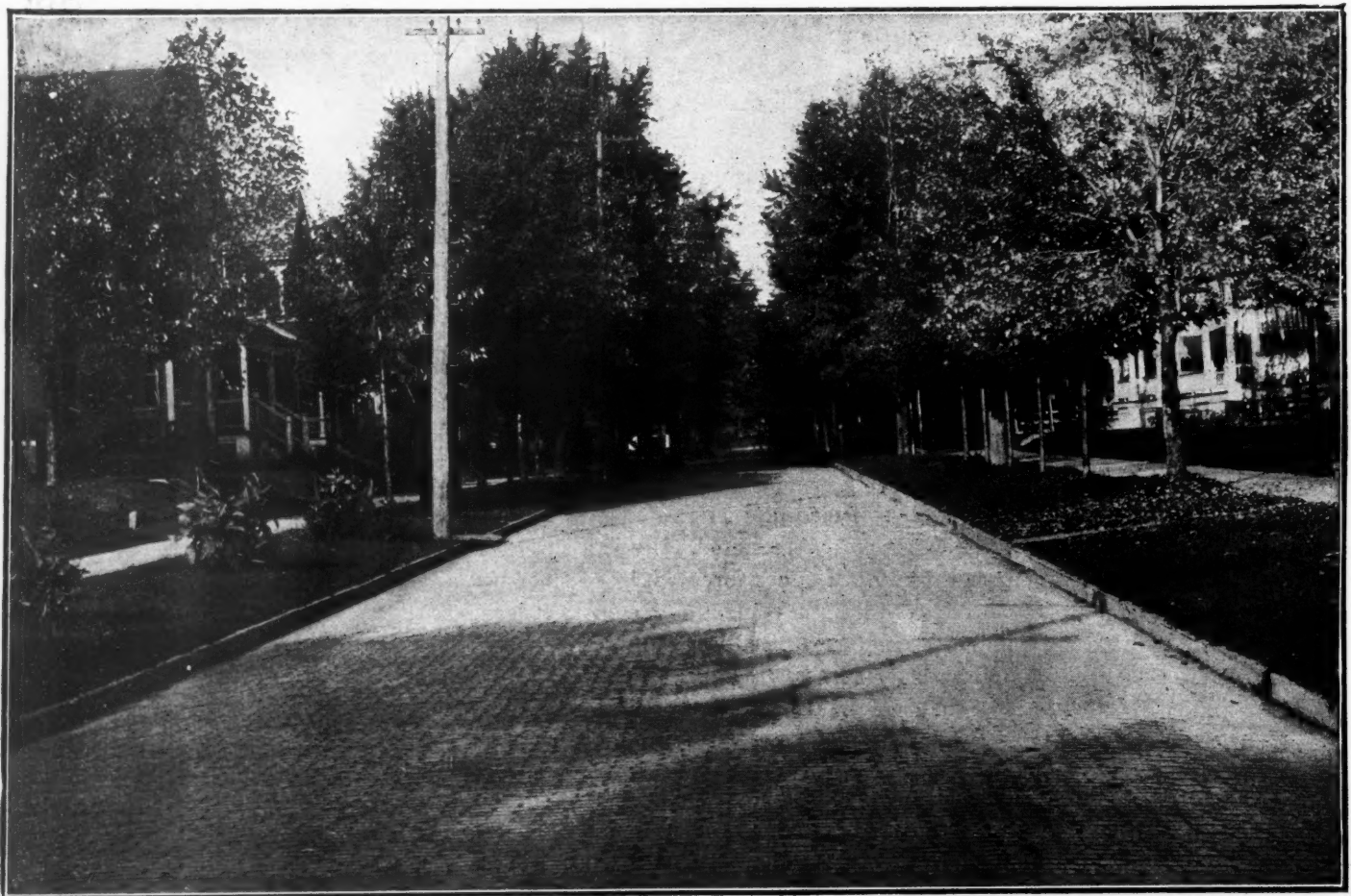
bers of the different Boards and other city officials, as already indicated, is broad, and he is permitted to remove any appointee at will, only being required to file his reasons in writing for the removal with the City Clerk. The code permits the Boards to name their Clerks and subordinate employees and to adopt regulations to govern them. To eliminate corporation influence from municipal government, no officer, agent, employee, or servant of any corporation, firm, company, or persons holding or operating under a franchise granted by any city, or having any contract with the city, shall be eligible to any city office. Neither can a city enter into a contract with an employee. Violation of these provisions renders the offender liable to a fine of \$1,000 and from one to ten years in the State prison. Different city attorneys have given conflicting opinions as to the validity of these prohibitions and thus far there has been no appeal to the Courts for a construction. There is much fear, however, that, taken literally, the section may deprive many Indiana cities and towns of the valuable services of experienced men who would not let their business connections influence them in the discharge of their civic duties."

The new code introduces a radical change in regard to the time limit for which public franchises may be granted, this having hitherto ranged from ten to thirty-four years, according to the nature of the franchise. The time limit is now struck out, leaving the municipalities a free hand in

this respect. Similarly, the former limit of ten years for contracts entered into by cities and towns with chartered corporations is extended to twenty-five years.

The provisions in regard to the letting of contracts include the somewhat equivocal stipulation that they are to be awarded to the "lowest and best" bidders, this being, if we read it aright, a decided improvement on some codes which deprive a council of all discrimination and compel them to accept the lowest bid. The code makes due distinction between "cities" and "towns" for local government purposes and for the incorporation of the latter after the legal requirement of 2,500 population has been met. All municipal elections will, in future, be held at the same time and at intervals of four years, the first under the new code being fixed for the present month. Officials then chosen will take office January 1 next.

It may be safely assumed that the operation of the code will be closely followed by numbers of States and municipalities throughout the country, inasmuch as the proved success of its chief provisions in one large city may be offset by difficulties arising from unsuspected differences in conditions among the smaller communities. In any case, the code stands as the result of much painstaking effort on the part of legislators and advisers alike, and it is in that sense that we have felt it desirable to place an outline of its provisions before readers vitally concerned in all that relates to civic government and effective administration.



TWENTIETH STREET, TOLEDO, OHIO, BETWEEN MONROE AND JEFFERSON STREETS; PAVED WITH METROPOLITAN BRICK

WATER METER RATES

As briefly announced in the September number of the MUNICIPAL JOURNAL, the recent Convention of the New England Water Works Association, held in New York City, had under discussion a lengthy report on meter rates, presented by a special committee to which this subject had been referred. The investigation was begun by sending out blanks, asking for information and statistics relating to the meter system in works under the charge of members of the Association; the information embodied in the seventy-two replies was then tabulated, and the general results derived therefrom are summarized in the Committee's report.

As set forth by the Committee, the problem before it was to "devise a method or methods by which meter rates can be arranged that will most nearly meet the following requirements, and do so with substantial justice to all classes of consumers and the greatest possible simplicity of operation." The requirements were defined as follows:

First, to insure a sufficient revenue to meet the demands of the system, whether it be a municipal system operated practically at cost, or a system owned by a private company upon which a reasonable profit must be secured.

If a sum is raised by taxation for fire protection (as there always should be if justice is to be done between consumer and taxpayer), that sum must, of course, be deducted from the amount of the total maintenance to find the amount necessary to be raised by meter rates.

Second, the method should be sufficiently flexible so that the rates may be easily changed in case of a deficiency or surplus of income.

Third, the method should allow of the use of meters upon services with a single faucet without increase over the faucet rate, unless for actual use or waste of water. It should also secure from large, well-plumbed places a reasonable amount to meet fixed charges, even if little water is used.

Fourth, the method should meet the conditions of places with a fluctuating population and a large seasonal use of water, such as summer and winter resorts.

Fifth, the method should be such that it can be adapted to the different conditions of works in which the fixed charges are high and the operating expenses low, as in gravity systems, and where perhaps a large use of water at a low price is desirable; or where, on the other hand, the fixed charges are lower in comparison with the operating expenses, as in a pumping or filtering plant, and where it is desirable for any reason to be prudent in the use of water, and where large use at low rates cannot be encouraged. The method should be one that will meet the requirements of a "flat rate," with no discrimination between users of water, and still permit the supplying of large users such as factories at a cost that will not be prohibitive in cases where it is desirable to encourage such use.

The Committee suggests, as the best practicable means of meeting these requirements, two methods of assessing rates for supplying water through meters. Under the "assess-

ment method," which the Committee believes to be the most scientific and adapted for general and permanent use, the rates would be levied as follows: A constant sum to be assessed each year upon each property based upon the frontage of the lot on one street, and without regard to the amount of water used. In addition to this assessment, a certain price per 100 cubic feet or 1,000 gallons to be charged for all water used through the meter. It is pointed out, in justification of this proposal, that there are certain expenses of a water-works system which must be met as long as the works are operated, which are affected but little, if at all, by the amount of water used, and that these expenses should be met by a revenue equally independent of that amount.

The "multiple minimum rate," so designated to distinguish it from the single minimum method now largely in use, is put forward by the Committee as being well adapted to securing a revenue similar to that obtained by fixture rates in works where the change is being made from fixture to meter rates, and where there are no data relating to the probable consumption with meters. It fixes minimum rates to be paid for different kinds of fixtures in use, and a price per 100 cubic feet, or 1,000 gallons, for all water used in excess of the amount paid for by the minimum rates at the schedule price. As many or as few fixtures may be used for the basis of the minimum as is considered desirable in each case. The Committee believes that, having regard to simplicity in accounts, it would be better to take only a few of the important fixtures as the basis. The method also fixes what may be called a total minimum, which allows the use of water for all purposes without consideration of the number or kind of fixtures.

A large part of the report is taken up by the discussion of these two methods and their operation under the varying conditions of water-works practice, and the Committee closes its important work, for the time being, by the following weighty expression of opinion on the subject generally:

That it is desirable for the Water Department to purchase, own and repair all meters.

That all public buildings, watering troughs, fountains, etc., should be metered, whether or not payment is received for the water so furnished.

That all gravity works should be provided with a meter for measuring the total draft.

That a "flat rate" without discrimination between consumers of different amounts should be the rule, but that it should be accompanied by some method for securing a revenue to meet fixed charges independent of the amount of water used.

The Committee also suggests the desirability of the general use of 100 cubic feet as a unit rather than 1,000 gallons. It is urged that the gallon should be eliminated as a unit of water-supply measurement and the cubic foot substituted. This change will undoubtedly come in time, but will perhaps be slow in coming, as the capacity of pumps, pipes,

reservoirs, etc., is so universally given in gallons, and so many tables are based upon that unit. One million gallons also has a firm hold as a unit for large quantities. It is, however, a step in the right direction to use cubic feet in meter measurement, and the practice of doing so is already widespread.

The Committee states, in conclusion, that it submits this report with a profound sense of its inadequacy. It has not the confidence to speak of its propositions as "recommendations." It feels that its accumulation of data is so small, its knowledge of the subject so restricted, and its work so inadequate in comparison with that to be done, that it cannot speak with authority. It therefore makes suggestions

which may be of some present value, but which can only be considered tentative and the work of a novice.

The Committee believes that this work should be continued by the Association; that it should encourage its members to secure and make available all possible data bearing upon meter operation; that perhaps a committee on meter rates, or better, upon water meters, should be a permanent committee of the Association to accumulate information and bring the matter forward for discussion at convenient occasions.

It is the desire of the Committee that its suggestions be thoroughly discussed and criticised, in the hope that more light may be shed upon this very important matter.

THE CHARACTER AND COST OF STREET IMPROVEMENTS

It is of hopeful augury for the success of the good roads movement that its discussion is no longer confined to civil engineers and others who might be expected to take a leading part in a matter calling for expert knowledge, but is actively shared in by what Disraeli once called "the ordinary channels of information"—the newspapers to wit. As illustrating this statement, we may refer, in the first place, to the data collected by the "News" of Newburgh, N. Y., and published in the columns of that enterprising daily a few weeks ago, premising any review of the figures themselves with the remark that the work performed by our contemporary formed part of a crusade in favor of the "assessment" plan of defraying the cost of street improvement. It is possible, of course, that this consideration entered into the selection of the cities applied to for information, but inasmuch as the collected data were verified by the City Engineer or the City Clerk in each case it will be seen that every care was taken to obtain authoritative information. The September number of the MUNICIPAL JOURNAL contained, on page 126, a reference to the position taken up by the Editor of the "News" which sufficiently emphasizes the importance of the distinction drawn between the assessment plan on the one hand and the "city-pay-it-all" method on the other.

Subject to the contingency alluded to above, there is no difficulty in arriving at the conclusion that the returns from the forty-seven cities communicated with show a decided repression of activity in this line of municipal work where the assessment plan is not in force. Of the entire number of cities, fifteen pay no portion of the expenses, that is to say, abutting property pays them all; seven pay only for paving street intersections; six pay less than one-third of the cost of paving; nine pay one-third; five pay one-half and five pay the entire bill. The five last referred to are Fitchburg and Haverhill, Mass., New Britain, Conn., Woonsocket, R. I., and York, Pa. It appears that these, with an aggregate population of 157,000, have only 7.7 miles of paved streets, an average of eighty-six linear yards to each thousand of population. The "News" contrasts the equivalent of this figure with that obtained by striking an average among twelve cities requiring "abutting properties to pay a portion

of the cost commensurate with benefits received." The populations of these cities range between 40,000 and 16,000, with an aggregate of 367,000, giving an average of three-quarters-of-a-mile of paved streets per thousand inhabitants—fifteen times as much as the average for the five cited cities still laboring under the disability to which attention is directed by the "News." In connection with the question of population, it should be noted that the idea was to obtain, as far as possible, data from cities of the same size as Newburgh, the population of that city being 25,000. For this reason, and doubtless also because Cohoes, N. Y., has recently completed a comprehensive scheme of street and other improvements, special attention was given to the latter city, which, with a population just below that of Newburgh, offers a striking contrast in regard to the execution of municipal works. In the eight years 1896-1904 a special Commission at Cohoes "paved a large mileage of streets, built a complete sewer system and made other improvements at a total cost of \$601,601," and this, too, without the imposition of any very heavy burden upon general taxpayers. This is largely due to the fact that \$294,713, practically half of the total expenditure, was assessed upon benefited property. Readers of the MUNICIPAL JOURNAL will remember that a copiously illustrated article in the issue of May last was devoted to an account of what had been done in Cohoes in the line of street improvement.

Turning to the question of material, the "News" included forty-seven cities in its inquiries, these possessing about 885 miles of paved streets, this length not including macadam, "erroneously enumerated as paving by some city engineers." The total is made up of 460 miles of sheet asphalt, 360 miles of brick, 24 miles of block asphalt, 20 miles of granite, 17 miles of cobblestone and nearly four miles of bitulithic. "The majority of Eastern cities report sheet asphalt the most satisfactory pavement, because of 'its fine appearance and the absence of noise,' 'its low cost,' 'durability,' and because 'it is sanitary, easily cleaned and when repaired is practically a new pavement.' . . . The West finds sheet asphalt satisfactory but rather costly compared with brick. Asphalt being an imported product, the freight

charges from the seaboard make it higher in price in the West than in the East. Still, much asphalt paving has been going on in Western cities of late, where it is especially in demand for residence street improvement. Albany finds brick 'pleasing in appearance and fairly durable.' In New-castle, Pa., where only brick and block asphalt have been laid, the former material is favored because 'it wears longer.' Poughkeepsie says brick seems to wear better, but sheet asphalt is less noisy and better appearing." A point brought out by the "News" inquiries is that "the average Western city is considerably in advance of the average Eastern city in street improvement."

Prominence is given the city of Chester, Pa., as a city having a rather larger population than Newburgh and occupying the position today, in regard to street paving, which Newburgh may eventually attain. "Chester has twenty-four miles of permanently improved streets. The city pays for street intersections, also the difference between the flat bid and ten-years' guarantee, the latter being equivalent to the city providing for repairs to the pavement without expense to abutting property." The information utilized by the "News" was not wholly derived from city officials, an editorial colleague in Newark, N. J., contributing the statement that Newark had "indulged in many miles of asphaltum, which is a good pavement, but it is realized now that costly repairs make it undesirable. Opinions turn favorably to brick, which has been tried for several years and wears well and is easily repaired." With a population of 255,000, Newark is reported as having fifty-one miles of sheet asphalt and over eleven miles of brick paving.

Another contribution to the literature of this subject was published in a recent issue of the "Milwaukee Sentinel," the author being Mayor Williams, of Ashland, Wis. Starting with the reminder that, ten years ago and outside of wooden block pavements, there was practically nothing in the form of a permanent pavement anywhere in the State of Wisconsin, except in Milwaukee, it is shown that "to-day nearly every city above 5,000 population in Wisconsin possesses pavements of a permanent and durable character, and the tendency has been, during the last four or five years, to construct them after the most modern and scientific methods possible." As an example of the activity displayed, the city of Racine, which fifteen years ago made practically no effort in that direction, has expended \$400,000 in the construction of asphalt, brick and macadam pavements. "A careful compilation of figures submitted by the city engineers in Wisconsin of cities that are over 5,000 population shows that this year between \$800,000 and \$1,000,000 will be expended for permanent, modern street pavements, and of this amount \$112,000 will be spent for asphalt, about \$300,000 for vitrified brick, and \$800,000 for macadam."

Without discussing Milwaukee, the article proceeds to state that seven classes of modern pavements are represented in the State, these being asphalt, bitulithic, brick, limestone, wooden blocks, tar-macadam and macadam. Tar-macadam is confined to Oshkosh, where the success of experimental blocks laid down last year, under the direction of an expert from Hamilton, Ont., is likely to lead to a more extended use of this material. The following table, form-

ing part of the "Sentinel" article, gives in succinct form the leading data in regard to Wisconsin cities having over 5,000 population:

	No. of Blocks.	Asphalt. Aver. cost, sq. yd.	No. of Blocks.	Brick. Aver. cost, sq. yd.	No. of Blocks.	Macadam. Aver. cost, sq. yd.	No. of Blocks.	Wood Block. Aver. cost, sq. yd.
¹ Superior	6	\$2.13	64	\$1.50	34	\$1.10	333	\$1.00
² Racine	6	1.79½	11	2.00	45	.85	60	.75
³ Oshkosh	38	2.00	80	1.90	120	.78	114	.70
La Crosse			1	1.79	321	.79		
Sheboygan					50	.97	50	1.00
Madison					450	.50		
⁴ Eau Claire			19	1.36	70	.60	7	
Appleton					40	1.30	60	.89
⁴ Marinette			22	1.47	119	.62	28	.72
Fond du Lac			17	1.90	14	.50	55	.60
Green Bay			2	2.04	55		82	.83
Ashland	17	2.19			48	1.00	40	1.25
⁴ Beloit			25	1.15	6	.60		
Manitowoc			8	1.85				
⁴ Janesville			11	1.60	78	.50		
Wausau					107	.45	14	.72
Chippewa Falls			17	2.19	3	.82		
Merrill					47	.40		
Watertown			29	1.70	40	.52		
Waukesha			36	1.37	60	.59		
Beaver Dam					100	.35		
Antigo					4	.70		
Menominee			9	2.13				
⁴ Portage			7	1.00	100	.25		
Baraboo					60	.50		
Marshfield					3	.61		
Neenah					3	.50	10	.75
⁴ Stevens Point			6	1.61	30	.43	12	1.97
Ripon			3½	1.59				
Menasha					10	.45	3	

¹ 24 blocks of bitulithic. ² 13 blocks of limestone. ³ 2 blocks of tar-macadam.

⁴ Brick pavement laid on sand, gravel or macadam.

Mayor Williams records, as one of the prominent results of his efforts to learn the opinions of city engineers and others, "a unanimous sentiment regarding brick, and that is, that it is a satisfactory pavement. In most cities the brick pavement has been constructed upon a five or six-inch concrete foundation, but there are several places where the brick layer has been laid on a macadam foundation, and in some instances the brick have been placed upon sand or gravel, and in every case the statement of the Engineer in charge has been that the brick pavement has been highly satisfactory." Elsewhere he remarks that "it seems to be quite generally the opinion among the engineers that brick is the best pavement for business streets, with macadam for residence streets, in these smaller cities."

We direct attention to the following paragraph, with which we must close the present review of two exceptionally interesting publications, as indicating Mayor Williams' views in regard to the debatable question of road widths:—

"A question of considerable importance to cities that are constructing pavements is the settling of what width the pavement should be. The tendency nowadays is to make the pavements as narrow as possible, and still accommodate the traffic, for this means less of an outlay for the original expense, and requires less for maintenance and repair, and in addition it has been shown that with most pavements where the street is so wide some portions are little used, that the pavement deteriorates more rapidly than when in constant use. A pavement just narrow enough to accommodate the traffic is what should be put down. It thus affords opportunity to have wide, attractive boulevards on each side. Waukesha, with thirty-seven feet as the width for business pavements and twenty-eight feet as the width for residence pavements, has the narrowest of any city in carrying out this plan."

THE MUNICIPAL OWNERSHIP PROBLEM

THOSE who are interested in the compilation of authentic data in regard to the ownership of public utilities will welcome such information as is to be gathered from the reports of U. S. consuls, especially those who have opportunities of keeping in touch with municipal affairs in Great Britain. We have drawn upon these documents on several occasions and, as we have reason to believe, not wholly without profit to readers of the MUNICIPAL JOURNAL. Special interest attaches to recent publications of this character because they deal impartially with both sides of a problem which is sure to be the occasion of more or less heated controversy before even an approach to unanimity is reached among those claiming to be heard.

Municipal activity in Nottingham, an English manufacturing city of 250,000 population, has recently been dealt with by Consul Mahin. He shows that the city now owns an electric light plant having fifty miles of distributing mains, the whole of the wires being underground. The progress made in the ten years since the works were started is indicated by the statement that the unit price has been reduced each year, the decline being from 11.94 cents in 1895 to 4.14 cents in the year ended March 31 last. The net profit in the ten years exceeded \$300,000, of which \$158,161 was appropriated to the relief of the "rates," *i. e.*, local taxation, the balance going to the reserve fund of the undertaking. The sum applied to reduction of rates during the past year was \$29,199.

The electric street railway system yielded a net profit, in the year, of over \$100,000, the rates being benefited by \$72,997, and the reserve fund raised to nearly \$200,000. The average fare collected was 2.16 cents. The penny (two cents) stage averages 1½ miles; twopenny, 2.9 miles, and threepenny, 4.4 miles. Before 8 A. M. workmen can ride double distance for single-distance fares, and receive return coupons for evening use at the same rates. This feature is not a financial success. The cars are all double-deck; some have the upper deck enclosed. The total receipts averaged 23.78 cents per mile run, and the working expenses 14 cents. A noteworthy feature is the freedom from accidents, only one death from this cause being recorded in 1904. The last death previous to this occurred in January, 1902, since which time the cars have run 7,250,000 miles and carried 80 millions of passengers.

The city's gas undertaking showed a net profit exceeding \$150,000, of which the rates received \$131,395. Consumption decreased in comparison with the preceding year, due largely to the extending use of incandescent burners, which, it is estimated, increase the light obtained from 3½ candles to 20 or 30 candles per cubic foot of gas consumed. The price charged for gas is 60 cents per 1,000 cubic feet to ordinary consumers; for power purposes, 44 cents per 1,000 if not exceeding 50,000 annually used, and 36 cents if more than 50,000. Such special rates, which generally obtain in all the Midland cities, are found necessary to compete with gas-power plants and to prevent factories from establishing gas plants of their own. The total mileage of mains is 351.

The city area supplied with gas is 10,935 acres, but gas is also furnished to surrounding villages and country houses covering an area of 72,426 acres.

The water-works were originally in the hands of a company and on that account might be expected to make a poor showing, British legislation and procedure being conducive to onerous financial terms in the acquisition of corporate properties. Consul Mahin reports, however, that a net profit of \$25,000 was made during the year, with no relief to rates in this case. The works supply a total population of about 327,000, many outside areas participating in the benefits of the plant. With a total consumption varying between five and eight millions of gallons per day, a mean consumption of something like twenty gallons per head is arrived at—a figure well worth laying to heart in this country when the necessity for filtration and other items demands the most rigid inquiry as to the sources of American extravagance in this respect.

Less favorable results, this time from a municipal street railway, are reported by Consul Daniels, of Sheffield, that large and important city, of over 430,000 souls, finding itself confronted with a loss, due to the excessively low fares which have been a prominent feature in the policy of the special committee concerned. The deficiency of income has prevented the setting aside of an adequate sum for depreciation of plant—a position, however, in which Sheffield is not supposed to stand alone among English cities nominally making a profit out of similar undertakings. The conditions disclosed by Consul Daniels are sufficiently remarkable to justify the following lengthy extract from his report, his information being derived from the report of the Tramway Committee for the past year:

The mileage run was, 1901, 2,315,347 miles; 1902, 3,701,993; 1903, 4,926,083; 1904, 5,768,231; 1905, 6,049,899. The passengers carried rose from 61,450,993 in 1904 to 63,952,283 and the revenue from all sources from \$1,130,738 to \$1,170,713, an increase of 2,501,200 in numbers, \$39,975 in revenue, and 281,668 in car mileage over the previous year. In 1901 each car earned on an average 27 cents per car mile run and the average fare per passenger was 1.8 cents. The figures for the following years were: 1902, 23½ cents and 1.8 cents; 1903, 20½ cents and 1.8 cents; 1904, 19 cents and 1.8 cents; 1905, 19 cents and 1.8 cents. If the fares per passenger in 1905 had been the same as in 1901, the revenue would have been increased by the sum of \$37,472. The average fare per passenger in Manchester was 2.38 cents; Bradford, 2.26 cents, and Liverpool, 2.22 cents.

The average working expenses per car mile in 1901 were 14.5 cents; in 1904 they had gone down to 13 cents, while in 1905 they had been further reduced to 12.8 cents, which is the lowest in the history of the undertaking. Had the working expenses in 1905 been the same as in 1901 the charges would have been increased by \$152,095.

The net profit in 1904 was \$132,412 and in 1905 \$84,217, or \$48,665 less. This decrease was not due to cost of management being excessive, because the percentage of that cost

was less than ever before; nor was it due to the cost of production of energy, for that cost in Sheffield is among the lowest in the country. The decreased profit was in the first instance attributable to the increased charges in 1905 over 1904, without any corresponding increase in revenue. Salaries and office expenses previously charged to capital are now transferred to revenue, and represent \$10,123; rates and taxes caused by reassessment, \$17,817; repairs to cars, permanent way, and power station, \$37,536; interest on loans, \$35,132; installments for sinking fund, \$22,193, making the total increased charges over the previous year \$122,801. To be deducted from that were \$10,738 decrease in traffic expenses, \$2,655 saved in insurance, and \$12,348 decrease in power expense, a total of \$25,741.

These figures have an added value in the light of a comparison made by Consul Daniels between the Sheffield conditions and those existing in Leeds, another industrial center, about forty miles northward, with a population of 450,000, and having an advantage over Sheffield in the matter of gradients. The respective figures are given as follows:

Car miles run: Leeds, 7,051,823; Sheffield, 6,049,899. Receipts: Leeds, \$1,432,347; Sheffield, \$1,170,709. Expenditures: Leeds, \$784,951; Sheffield, \$794,616. Passengers carried: Leeds, 64,223,660; Sheffield, 63,952,283. Average fare: Leeds, 2.19 cents; Sheffield, 1.8. The average

distance traveled in Leeds for 2 cents was 1.57 miles; in Sheffield, 2.48, or nearly a mile more. The Lord Mayor of Sheffield, Sir Joseph Jonas, who insists that the unfavorable conditions in that city have existed for some time, is authority for the statement that Sheffield fares are 17 per cent. cheaper than the next cheapest in the country. If they were based upon Leeds fares, Sheffield would have an increased yearly revenue of \$253,058, provided the same number of persons traveled and the Leeds rates were adopted.

The city authorities are constantly besieged with applications for extensions of the tramway service to outlying districts. This is felt to be a policy that ought to be adhered to, but it is apparent to all that no further extensions of the service can be made without providing in some way for increased revenue. It is also conceded now that the past policy of the tramway management has been wrong, in that enough has not been allowed for depreciation and renewals. The city of Glasgow sets aside 6 cents per mile for depreciation; Manchester allows 2.4 cents, and Liverpool 2 cents. Sheffield is supposed to allow 2 cents, but if it had done so the account, instead of showing a surplus of \$84,321, would have shown a deficit of \$38,348.

There, the report states, the matter stands at present; the only remedy in sight appears to be to raise the rate of fare, and that no member of the City Council advocates.

GARBAGE DISPOSAL IN ST. LOUIS

THE present method of dealing with the garbage of St. Louis, under which the material is taken twenty miles down the river by boat and there dumped on an island, has long been regarded as objectionable. Its cost is estimated by the local Civic Improvement League, which has devoted two years' study to the problem as a whole, at \$186,900 a year, and dumping is described in a recent exhaustive report of that body as "the worst possible method that could be devised." This, the report proceeds to state, "is clearly indicated by our present 'hogger' on Chesley Island, which can be eliminated from the discussion at the outset as unsanitary, antiquated and a menace to health."

The method of collection, apart from the mode of disposal, is also scored in the report: "None will maintain that the present system in St. Louis is sanitary. It is practically impossible to make the wooden beds of the present wagons sanitary, even though they are lined with heavy sheet-iron. This lining merely serves as a catch-all for the foul material which unavoidably collects under it. Furthermore, the drop gate of the present wagons makes it impossible to prevent the filthy water from dripping along the street. The only strictly sanitary form of bed is one of solid metal, with parts carefully riveted together, kept well painted, water-tight and capable of being thoroughly cleansed after each load is emptied." Objections are also raised on the ground of expense, this being largely due to a common factor in garbage disposal problems—the long haul from the extreme limits of the city—figures given by the League showing that the

city is paying \$1.67 per ton for collection alone. The report dismisses the proposition to obviate this by the erection of three or four disposal plants in different sections of the city, on the ground that no section of the city will submit to the erection of a garbage plant in it without serious protest, besides which, a number of separate plants will cost considerably more for maintenance than a single one. The report proceeds to enunciate the League's recommendations in regard to an improved system of collection, as follows: "The purchase, by the city, of wagons with removable water-tight steel beds; the erection of several receiving stations and switches in different sections of the city, equipped with driveways and lifting cranes; and a contract with the United Railways Co. or other electric or steam railway company, to haul the loaded flat cars to the scow on the river or directly to the disposal plant and to return the beds after they are thoroughly cleansed to the receiving stations. This system of hauling, at present in use in Washington, Cleveland, Indianapolis, Detroit and a number of smaller cities, has proven to be thoroughly sanitary and satisfactory. Furthermore, this method of unloading the garbage at the disposal plant by machinery will greatly reduce the present slow and expensive method of unloading by hand on Chesley Island, which has cost the city \$44,015.25 during the past seven months. This means that the cost of unloading the garbage at Chesley Island alone is costing approximately \$1 per ton. This per-tonnage cost, added to the cost of collecting and disposing of the city's garbage, makes a

total, under the present unsanitary method, of \$2.67 per ton."

Taking up the question of a remedy in regard to disposal, the League report discusses the method of incineration at some length. This method, it is stated, "finds its strongest defence on the score of being perfectly sanitary." But it is also urged that so many failures have followed attempts to adopt it in American cities "that it should not be adopted in St. Louis until after the most exhaustive and scientific investigations of the elements composing the garbage have been made by experts to see whether or not cremation is feasible." In support of this attitude, the report refers to the unsanitary operation of incinerators at Pittsburg, where a reduction plant has finally been erected, a similar experience at Indianapolis being also recounted. On the other hand, it is shown that Memphis and Minneapolis are successfully using this method, but in these cases the city burns with the garbage the entire refuse of the city. The conditions, therefore, are more nearly those prevailing in England, where, as is well known, "the incinerating process is used almost entirely, and the steam generated by the burning of the refuse is used in supplying many hundreds of horse power for electric lighting and for pumping sewage and water. But there is a fundamental difference in the conditions as they exist in English cities. Here in America, we have a much larger quantity of garbage per capita and it contains a much higher percentage of water; so that the situation there cannot be taken as a basis for determining the method of disposal in America. The fact that only one of the first fifteen cities in America is using the incinerating process is a strong

argument against its adoption by this city, where the garbage contains a high percentage of water."

Reduction processes are suggested as affording the most hopeful solution of the difficulty with which St. Louis is confronted. "No incinerator company will guarantee the disposal of the city's refuse with an actual profit to the city, and few contractors will guarantee to burn the garbage and refuse for less than fifty cents per ton. The reduction process, on the other hand, furnishes at least one excellent example of a municipally-controlled reduction plant which has operated for six months at an actual profit of over \$3,000 to the city. This record has been made by Cleveland, O. The following figures are taken from the official reports of W. J. Springborn, Director of the Board of Public Service of that city:

Gross income from the sale of by-products and other incidental sources.....	\$30,013.75
Expenses, including labor, fuel, repairs, insurance, depreciation and interest on investment.	26,579.59

Profit to the city.....	\$3,434.16
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"Mr. Springborn further adds in a letter that he feels confident that after the new plant now under construction is completed, the city will have a net profit of \$10,000 per year from the reduction plant."

In pursuance of this line, estimates are given which, while showing a higher cost for the erection of reduction plants, indicate a saving in the matter of annual expense. As action by the city will probably follow the consideration of this valuable contribution to the subject, we hope to present further information in regard to it.

MUNICIPAL OWNERSHIP IN GERMANY

DR. L. S. ROWE, Professor of Political Science in the University of Pennsylvania, left this country some months ago in order to study European municipal ownership on the spot. The views expressed on his return, dealing with municipal transit facilities in Germany, are given at length in "Bradstreet's," as follows, their authoritative source leading us to give them in full:

During the last few years the movement for municipal ownership has acquired great headway in Germany through the municipalization of the street railway systems. Within less than ten years some thirty municipalities have acquired title to their street railway lines and are operating them. The most important developments in this direction have taken place within the last four years.

It is a fact that the movement for the municipal ownership of street railways is due largely to the failure of private corporations to furnish adequate transportation facilities. The congestion of population in both German and French cities made the extension of the street railway service a matter of vital import to the social welfare of these communities, but the companies were unwilling to extend their lines to meet these needs. The contest between the conservatism of the companies and the demands of the people

was brought to a crisis as soon as the companies began to request the privilege of substituting electricity for horse power. The city authorities were willing to make the grant, but could not induce the companies to agree to the terms upon which the grants were conditioned. The only solution to the deadlock seemed to be municipal ownership.

The period of municipal ownership and operation has been too short to permit of any final judgment. Financially the results have been disappointing, but this has been due in part to the heavy payments which the cities were compelled to make to the companies as indemnity for their unexpired franchises.

The one notable achievement under municipal ownership has been the extension of street railway lines into the outlying districts, thus relieving the congestion of the densely populated central districts. The readjustment of fares, with a view to favoring the migration of the working classes into the suburban districts, is another of the important services of municipal operation. Comparison with American conditions is extremely difficult, and in most cases misleading. It is important to note at the outset that no city of continental Europe enjoys rapid transit in the sense in which we understand the term in the United States. This defect

cannot be laid to the door of municipal ownership, as the conditions are the same whether the street railways are under private or public control. The real cause is to be found in the fact that until the recent extension of the territorial area of German cities, the need for rapid transit was not keenly felt.

The fares in all German cities are considerably lower than in the United States for short rides ranging from one to one-and-a-half miles. Two and one-half cents pays for a ride of one and one-fifth miles and for one transfer. Monthly commutation tickets over one-mile sections of the road are sold for \$1.50, and over the entire system for \$3.25. In Nürnberg a uniform fare of 2½ cents over the entire system has been introduced.

The city authorities realize that the uniform fare system best subserves the broader interests of the community, but, with the exception of Berlin, the system has proved financially disastrous wherever tried.

If we inquire into the reasons why German cities are able to offer relatively low fares, and still derive a profit from operation, we find the cause to be the relatively low fixed

charges of the German street railway accounts. The capitalization per mile of track of the German municipal lines ranges from \$23,809 in Munich to \$54,138 in Nürnberg. Even this capitalization has been largely increased by the large indemnities paid to private companies for unexpired franchises. When we compare this capitalization with the \$259,542 per mile of track of the New York surface railways and the \$165,085 of the Philadelphia system, the difference is readily apparent.

Municipal ownership and operation of street railways in Germany were begun under the most trying conditions. The cities, immediately after purchasing the lines, were compelled to make large expenditures for electrical equipment, and, to add to the difficulties, the change was made during a period of industrial depression which seriously affected the traffic. In spite of these difficulties, more than four-fifths of the cities which have embarked upon this policy are running the lines at a considerable profit and are gradually introducing a policy which is fostering the social welfare of the community, as well as the financial interests of the city treasury.

THE PREPARATION OF CONCRETE

WE extract the following from "The Architects' and Builders' Journal" (Baltimore) for October, and append to it some comment tending to make clear the conditions governing a decision in the important matter of wet or dry mixing:

"In preparing concrete the sand and cement should be mixed dry first, then add water, and then subsequently add the crushed stone, gravel, or whatever the aggregate is to be, and then thoroughly mix the mass. All mechanical mixing also, by whatever machine, should follow this rule. It should be transferred in as large quantities as possible to the work in dump wagons, wheelbarrows or carriers, and dumped as nearly as possible in position in a six-inch layer, as shoveling and rolling tend to roll out the stone, thereby making an excess of aggregate at one point and pure mortar at another.

"It should then be tamped to an even surface by a smooth iron tamper, preferably square, with six to eight-inch square surface, and weighing 25 to 30 pounds. Do not attempt to deposit concrete under water where there is any way to avoid it. If used in this way at all, place in coarse jute bags and deposit them in layers as close together as possible and tamp hard. This prevents loss of strength in the concrete, and enough cement comes through the bags to bind the mass.

"The proportion of mortar to aggregate will vary according to materials; in screened, crushed stone it will require nearly one-half mortar to fill voids and give the slight excess desirable.

"Where the rock is used 'crusher run' the percentage of voids is only about one-third, and if the material is clean and all stone the result is excellent and to be desired. But let me sound a note of warning here and say that 'crusher run,' to the quarryman, quite frequently means everything

in his quarry that can be got on a shovel. This means additional worry for the inspector. If you are doing your own crushing in clean rock, however, you will get excellent concrete. Many of the railroads and the United States Government have experimented in this line and recommended crusher-run stone.

"No rule for composition of concrete can be laid down that will fit all cases, but I have found the following successful:

"For arches and watertight work, 1 cement, 1 sand, 3 stone. For heavier walls, requiring bulk and strength, but a lesser degree of permeability, 1 cement, 2 sand, 4.5 stone. For ordinary uses in abutments, heavy walls, paving, foundations, etc., 1 cement, 3 sand, 6 stone. A good common concrete in gravel is 1 cement, 2 sand, 5 gravel.

"For curbing I have obtained better results by using 1 to 3 or 1 to 4 of torpedo sand than by making a weaker body and trying to face the work by plastering molds with a rich plaster. From several years' experience in all kinds of concrete work and the examination of the leading structures in this country, I am very much down on facing concrete by plastering forms and decidedly in favor of getting results by using smooth forms and a mixture of about 1 cement to 3 of torpedo sand.

"Bulky walls, piers and abutments are often cheapened by dropping in large stones in layers in the center of the work, and where stone is cheap and hard there is no objection, if that is what you are paying for.

"Concrete has a great advantage over rough masonry for all work required to be watertight, as the mortar fills in all interstices and prevents the passage of water. The recent experience with the Jerome Park reservoir, New York, would have been avoided if the reservoir wall had been of concrete.

"The cost and often almost impossibility of ramming concrete to a solid mass is a weighty argument in favor of wet concrete. After considerable experience in this line and examination of many works of magnitude I conclude that a mixture wet enough to pour is the thing. Hand-tamping depends for efficiency on the 'location of the boss' and the 'personal equation' of the tamper."

The degree of wetness, referred to in the above excellent rules, is largely controlled by the circumstances of each case. The cardinal consideration is that every addition of water beyond what is necessary to ensure perfect incorporation of the components tends to reduce the tensile strength of the resultant mixture and that, from this point of view, a dry concrete is to be aimed at. Practical considerations, however, which have evidently received due weight in the framing of this specification, interpose the difficulty that it is not possible, under ordinary inspection, to guarantee even a reasonable degree of uniformity in this respect, and without this the risk is run of depositing imperfectly mixed concrete, the defects of which may easily outweigh any advantages aimed at in laying down a severe standard of dryness. It should not be forgotten, in this connection, that an insist-

ence upon sufficient turning over and mixing will go far to convert an otherwise excessively dry concrete into a tractable mixture, sufficiently moist to be easily worked into place, but this is just where the practical difficulty referred to is most potent in its effects. There are few cases in which the design of the work or the stresses to be met call for the last ounce of strength which the concrete is capable of yielding, and it becomes, therefore, a question for each superintendent or inspector to decide in how far it is necessary to keep the ultimate tensile strength of the material in view. We should deprecate, however, the general use of a concrete which will "pour," as suggested in these rules, believing that the adoption of such a standard would be placing a premium on the slovenly preparation of a material calling for all the care that can be devoted to it. It is important to remember, also, that where watertightness, rather than resistance to strain, is the essential requirement a much wetter mass may beneficially be used, so long as due care is taken to distribute what may be called the excess of water evenly through the entire volume. In any case, too much care can scarcely be taken in the matter of thoroughly mixing the dry materials before beginning the watering of the mass.

THE ESSENTIALS OF GOOD ROADS

In an address on "Canada's Ways and Highways," delivered at the Port Huron Convention of the American Road Makers' Association, Mr. A. W. Campbell, Deputy Minister of Public Works, Ontario, Can., gave an account of the organization and methods adopted in that Province in regard to roads improvement—a movement with which he has long been prominently identified. A system of Provincial aid has been established, and for this purpose \$1,000,000 has been set aside by the Government. Within the last two years 650 miles of macadam road have been constructed, the Province paying one-third of the cost. The fundamental idea is to place the main or leading roads under the management of the county councils, by whom a more perfect system of management can be established. Heretofore, practically all roads have been built and maintained by township councils. The Act under which the work is now being carried on provides that a county system may be adopted by any county council, the roads thus assumed being selected by mutual agreement of county and township councils. The work is carried on under regulations of the Provincial Highway Department, and is subject to its inspection, but this is made only with a view to assisting and advising the county councils and road superintendents and does not involve the placing of a Government Engineer in charge of the work. The usual width of road allowance in Canada is sixty-six feet, and this, for ordinary highways, is very satisfactory. "Less than this is not sufficient for possible requirements. More is apt to be, except in towns and cities, unnecessary."

The following notes on constructional features are capable of general application:

"The graded roadway should, as far as possible, be placed in the center of the road allowance. In unimproved roads,

it is very common to find the graded roadway straggling from side to side of the road allowance. This interferes with the drainage, adds to the length of the road for travel and construction, and is unsightly in appearance. This is a relic of the days when wagons had to wind around stumps and boulders in the road and if any of these remain, they should be removed. Wherever practicable, the grade should be straight and in the center of the road allowance.

The width of grade, on level ground between the inside edges of the open ditches, should rarely be less than eighteen feet, while a width of twenty-four feet will meet the needs of heavy traffic. A greater width than twenty-four feet is rarely necessary. Where there are high and unsafe embankments, the grade should be made wider. An unnecessary width of grade merely adds to the cost of construction and maintenance without corresponding benefit.

This entire width need not be metalled with gravel or stone. The ordinary practice is to metal only the central twelve feet for a single line of traffic. Near towns where traffic is heavy and vehicles pass each other at frequent intervals, it is better to make the metal roadway wide enough to accommodate two lines of traffic, or from twelve to sixteen feet."

In connection with further details as to materials, the author refers to concrete as "one of the most important and valuable materials of modern construction. The facility with which it can be moulded makes it suitable for a great variety of uses. It is, when properly made, of good materials, more durable than stone masonry, and costs less. While costing a little more than timber for bridge abutments and culverts, it is so much more durable that, after a term of years, it is much the cheaper of the two. In road and street work it is used for concrete tile, bridge abutments,

arches and short span bridges and culverts, bridge floors, foundation for pavements, curbs and gutters, sidewalks, retaining walls, and other purposes." He recommends this material for culverts, in preference to the smaller diameters and capacities attainable by the use of pipes. The concluding paragraphs of the address are as follows:

"Rural England owes much of its beauty not only to its good roads, but also to the well-kept roadsides, the magnificent trees, and beautiful hedges. It is a power that creates a love of country and an unfaltering patriotism. Grade and level the roadside as well as the road. Establish a good sod. Keep down the weeds. Let the fences be neat and tasteful. Plant groups of trees and shrubbery. Utilize any springs available near the road to make drinking places for horses and cattle. In doing all this preserve Nature at her best, making the most of natural advantages. The roadsides cannot, need not be converted into lawns, but they need not be the unsightly emblems of chaos that we so frequently find them. In building our roads, the original beauty of Nature is destroyed, and we owe it to ourselves to make such atonement as we can by restoring a certain amount of order and ornament.

In a popular campaign against old methods and long endured ideals, there is always danger that the people in their

enthusiasm may act too hastily, and create changes before new plans are matured, and the people properly instructed in the advanced methods.

Fixed plans and specifications cannot be laid down to meet all conditions of location, climate, soil, material and commercial requirements, but with a general understanding of the true principles of 'road making' careful experiments should be made and object lessons established in each locality for its information and guidance.

The people of this continent are awakening to the economic importance of this great question, which in turn must become our next great national work, and it is for those who are especially interested in this campaign to do all possible to guide and direct the present movement so that the enthusiasm may be controlled and directed in a business-like channel, insuring roads created to meet the real needs of the country.

This done, the century upon which we have just entered will be recorded as an era of 'Good Road Making' on the American continent, supplying our people with instruments of modern enlightenment, and relieving them from the sore tax which has been so long and so carelessly imposed by the bad management and ill condition of these necessary features of civilization."

TELEPHONES IN BERLIN

THE enormous growth of the German capital's telephone service has recently been discussed by U. S. Consul-General Mason, of that city, who believes it well worthy of study. Administered as a branch of the Imperial Postal Service, the employees hold their positions for life or during good behavior and receive pensions when they finally retire by reason of old age or disability. "From a beginning somewhat tardy, in comparison with other large European and American cities, the service has grown to one of the largest in the world, not less than 86,000 telephones being now installed in the public system of greater Berlin. The long-distance telephone service of this city embraces within its scope more than 2,600 cities and towns in Germany and other European countries, including capitals like Paris, Brussels, Rome, Vienna, and St. Petersburg. For this branch of the service the central telephone bureau is equipped with a staff of operators, mostly women, who are competent in the various European languages. The short-distance service includes the city of Berlin proper, which is divided into nine districts, each with its central exchange, and eighteen branch exchanges in the various suburbs within a radius of five miles from the central station in Berlin.

The cost to subscribers per annum for a telephone installation in Berlin is from 180 to 200 marks (\$42.84 to \$47.60) per annum, while for certain suburbs, where the instruments are less frequently used, the cost varies from 80 marks (\$19) at Adlershof to 140 marks (\$33.32) at Steglitz, and 160 marks (\$38.08) at Westend, which is the extreme western section of Charlottenburg. The largest number of instruments embraced in one district or exchange is District or "Amt" I., with 13,538 connections; next come Amt IV. with

12,884, and III. with 10,503. In the organization of the various exchanges one female operator is required to attend to the calls of from 100 to 200 telephones. The operators are carefully educated and selected, ably directed, and are for the most part alert and efficient. The connections between the various district exchanges are cased in earthenware conduits laid underground, but the wires to subscribers' instruments are mainly strung on high wrought-iron frames set on the roofs of the tallest buildings, and are never permitted in any position so low as to interfere with the fronts of buildings or the traffic of the streets. At all the branch post-offices and district exchanges, as well as at various other prominent places throughout the city, are automatic public telephones, which any person may use after dropping in the slot a 10 pfennig piece, the value of which is 2½ cents in American currency.

The rates for long-distance service are as follows for a communication which does not exceed in duration three minutes. The following schedule includes only Germany:

To all places within a radius of—

	Cents.
15 miles.....	5
30 miles.....	6
63 miles.....	12
315 miles.....	24
625 miles.....	48

The rates for telephone service to foreign countries are specially arranged with the governments of the several neighboring nations, and are relatively higher than those between points within the German Empire."

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NEW YORK, NOVEMBER, 1905.

Chicago

SINCE our last month's reference to it, the street railway situation in Chicago has been disturbed—it were rash to say changed—by the action of the City Railway Company in laying before the city authorities a proposition for a settlement of existing difficulties. To appreciate the scope of the Company's proposals, it must be recalled that the Company has hitherto based its position on the assumed possession of a ninety-nine years' lease, dating from 1858, the Act extending the term from twenty-five years having been passed by the Illinois legislature, in 1865, over the veto of Governor Oglesby and in face of a strong popular protest. Even then, it remained an open question whether the extension of the corporate life of the three companies then in existence carried with it the rights of occupancy in the city streets. Under the grant conferred by the city in August, 1858, these rights would lapse in 1883, and even allowing for the operation of the "blanket extension ordinance," subsequently passed as a means of staving off the settlement of an awkward dispute, the companies would possess no rights in the streets after July 30, 1903.

This must not be held to imply that the City Railway Company acquiesced in that interpretation of the ordinance; on the contrary, the contention has been persistently maintained that the Company's rights were governed by the "ninety-nine years" charter expiring in 1957—a fact which must be used as a measure of the "climb down" now indulged in, in offering as a part of its new proposals a twenty years' lease expiring in 1925. The remaining provisions are scarcely less revolutionary in their scope, including, as they do, an undertaking to reconstruct the tracks and roadbed, to keep in repair, sweep, sprinkle and clean the right of way, to introduce new cars of the best kind and to install a straight five-cent fare, with universal transfers except in one downtown district. More than this, it is act-

ually proposed to pay the city for the use of its streets as a location for a revenue-earning business, the compensation being fixed on the basis of a per-centage on the gross receipts, beginning with 3 per cent. for the first three years and rising to 10 per cent. in the last three. As if these provisions erred on the side of illiberality, the offer is also made, to be incorporated as a part of the agreement, to sell the undertaking, after not less than one or more than two years' notice, "for the fair cash value for all real and personal property, plus the fair cash value at that time of such of the Company's present rights as may then still be unexpired, regardless of the present ordinance"—these values to be determined by arbitration.

As we understand these terms, the offer of a five-cent straight fare includes the dual system of the City Company and the Union Traction Company, the latter being the successor in title to the Yerkes Company which began to exploit the Chicago traction field in 1886, and now falling into line by offering the city substantially the same terms as the former. In any case, these are such as to have given pause to some of Mayor Dunne's nominal supporters, who have laid themselves open to the reproach of being a "recreant majority" by their votes on various motions within the last three weeks, the final stage being still far off. Meanwhile, Mayor Dunne, if not exactly "lyin' low an' sayin' nuffin'," gives occasional indications of thinking a good deal, the very magnitude of the concessions offered inspiring him with reasons for rejecting them. Assuming that the companies have sold \$117,000,000 of stocks and bonds since 1883, while it is known that expenditures on tangible property have not exceeded \$27,000,000, he shows that the twenty-year franchise of 1883 has netted the companies \$90,000,000. He takes the stand that the granting of another franchise for a similar term is equivalent to entering into a partnership in which the city will hand over a franchise worth much more than the value of the tangible property to be furnished by the Company, the city receiving therefor an altogether inadequate proportion of the earnings.

There are many minor points, such as the proposed referendum on the acceptance of the proposals and the personality of the umpire in the event of the appraisers failing to agree on a selling value, but, looking at the question from a distance and in the dry light of reason we fail to see that the way is closed to that judicial discussion which, it is quite possible, the offer of the City Company was designed to promote. If, as some appear to believe, the gaining of a victory in the interests of municipal ownership is to be regarded as of more importance than the securing of first-class transit facilities on equitable terms, it is hopeless to look for anything better than the recriminations which have been too freely indulged in, but we are unwilling to predicate such a result from all that has already been achieved in the desired direction.

And Elsewhere

IN view of the enormous interests involved, it would be surprising if the proceedings in relation to the Chicago street railways had not invested that city with peculiar in-

terest in the minds of all who possess or claim a more than ordinary degree of knowledge in regard to municipal affairs. This consideration is no doubt responsible for the attention given certain utterances of Mr. Marshall Field—Chicago's merchant prince—on his return from Europe a fortnight ago. His opinions on municipal ownership have at least the merit of being sufficiently outspoken, for he considers the whole thing a fad, which will drop out of the public mind, like the silver question; he predicts that within five years Americans will not hear anything about it, and has no faith in the proposition that it would tend to do away with graft. On the contrary, he believes that opportunities for corruption would be greatly increased, and sees dangers ahead in the impossibility of operating, as a city, the various undertakings which demand skilled and tried hands. Referring more specifically to telephone plants, Mr. Field says that neither New York nor Chicago would put up for a day with the conditions existing in Paris, where the municipality owns and operates the system, but he might fairly have said a word or two about the company-controlled system in London, which is notoriously defective, in common with that of the National Telephone Company in Great Britain as a whole. English people have resigned themselves to these conditions for a further period of six years, when the twenty-five years' license, granted in 1886, will expire by effluxion of time. The Post Office, which already owns the trunk lines, will then take over and extend the system, probably on the lines which have made the British telegraph service a thing for Americans to regard with envious despair.

The influence of the personal equation in forming convictions is exemplified by the fact that a fellow-passenger on the ocean steamer, Mr. James B. Reynolds, formerly a University Settlement worker and secretary to Seth Low during his New York mayoralty, gave out very different views to Mr. Field on this topic, finding confirmation of them in the successful municipal operation of street railways, telegraph and telephone services, water and lighting plants and public utilities generally in Osaka, one of the largest cities in Japan.

But the street railway problem, intricate as it is, is not the only one vexing the souls of the Chicago authorities. A system of tunnels, on which work was begun under an ordinance passed in 1899, ostensibly for the purpose of carrying the wires of the Illinois Telegraph and Telephone Company, has been extended until more than thirty miles of the original size have been laid, and work is now in progress on others considerably larger; even the smaller cross-section has been found adequate for the profitable conveyance of merchandise and other matter in which speed was an object. The city has tardily realized this unwarranted extension of powers and is taking steps to deal with it, the most hopeful indication of ultimate success being found in the slump which has overtaken the stock of the controlling company. Here, again, parallels are to be found elsewhere. The attention of Mayor McClellan, of New York, was recently called to the sinking of a shaft, in connection with a proposed tunnel to Long Island City, in the absence of any franchise from the city, and trouble has likewise arisen out of the refusal of a New York traction company to re-

move from the streets tracks no longer used, save only in so far as it chooses to run an occasional car to maintain the "right."

We direct attention to these instances of corporate usurpation, not merely because of their intrinsic importance, but because the time is opportune for an awakened public conscience on the whole question of alienating public rights and possessions. With no brief for or against municipal or other ownership, we feel that existing conditions require immediate amendment and that the evils inherent to them will increase with every day that they remain unassailed.

The Asphalt Scandal

TESTIMONY given in New York, October 17, by General Francis V. Greene, formerly President of the National Asphalt Company, in the case of the Venezuelan Government against the New York and Bermudez Asphalt Company, revealed the fact that he learned, on his return from Europe in 1901, of material assistance having been given the Matos revolutionary cause by his Company. This had been done, and was admitted by, Messrs. Mack, Andrews and Sewall, the former being Vice-president and controlling a large majority of the stock. The amount of money already so spent by the Company, at the time he was told of it, was in the neighborhood of \$100,000, and he not only disagreed with the policy of the three gentlemen named, but informed them that, as a consequence of it, he would be unable to continue his representations to the Washington State Department which, he stated, had hitherto assisted in enabling the Company to continue in possession of its Venezuelan property. His connection with the Company ended a few months later.

Confirmation of General Greene's statements was given on the following day, at Washington, by Amzi L. Barber, who was President of the National Company prior to 1901. He gave the further information that arms were shipped to the revolutionists, by the Company's agents, in the steamer Ban Righ, which was purchased, armed and equipped by money so provided. His testimony went to show the entire freedom, on General Greene's part, of any knowledge of, or connection with, these proceedings. On the other hand, General Andrews, testifying on the 19th, in the closing session for the hearing of witnesses in this country, stated that, in addition to the \$100,000 disbursed as alleged, a sum of \$30,000 had been paid by General Greene himself. Ultimately, General Andrews was brought to admit, as one "West Pointer and gentleman" speaking of another, that General Greene did exhibit some surprise when informed of the action of his colleagues in regard to the rebellion. The suit, it should be noted, is brought for \$11,000,000 damages because of the alleged participation of the Bermudez Company in the uprising.

We give prominence to these facts because of their bearing upon a matter already commented upon in these pages, notably on page 276 of our June issue and on page 120 of that for September. The good name of this country has been endangered by those who, in the pursuit of their own selfish interests, allowed no obstacles, moral or material, to deflect them from their course. It is not too much to say

that the country was brought to the brink of what, as subsequent events have shown, would have been an unrighteous war by the machinations of an unscrupulous and grasping corporation.

Graft

THE fact that Mr. J. Edward Simmons, the head of a New York financial institution, should have chosen this subject as the foundation of his address before the Annual Convention of the Maryland Bankers' Association is but one indication, out of many, of the hold which recent disclosures have obtained on the public mind. It may well be doubted whether it would have been possible, without the stimulus given by revelations of this character, to have enlisted such wide-spread attention in regard to conditions already known to exist, and it is in that connection that danger probably lies, for it is difficult to approach the discussion of a remedy under the influence of an indignation for which only too much justification can be urged. Mr. Simmons himself affords an example of this danger in his apparent assumption that every national, municipal and business institution is steeped in corruption. He does well, of course, to direct the gaze of the public upon the startling change which has come over once accepted views of public and private morality—a change significantly diagnosed by the use of the milder term "graft" for that which our immediate forefathers were content to characterize as robbery—thereby "indicating men's tolerance in these latter days of a thief and his trade." And it is only too true that current history offers every justification for his inclusion of National, State and municipal officialdom, as well as those entrusted with private interests, in his scathing denunciation. But it is possible to overdo these things, especially at a time when, as is urged by a writer in a recent issue of "Leslie's Weekly," "one does not need to be a chronic optimist, and much less a mere dreamer of dreams, to entertain the confident belief that we, of America, have touched bottom, and something more, in the matter of municipal corruption and depravity, so long our national shame and reproach."

Referring to what has been revealed in Philadelphia and by the legislative investigations in New York, the same writer observes that it is not to be believed that these cities will ever return to their former depravities. "No careful observer of the signs and tendencies of the day in America can have failed to note the many indications during the past few years of an awakened civic conscience on the part of the American people, a more general and intelligent interest in the conduct of municipal government, and a new, or renewed, determination on the part of the great body of municipal electors to purify the fountains of municipal authority, and to keep them pure by putting better, abler, and more honest men in charge of the fountains." For ourselves, we prefer to believe, not only that adequate ground for this more hopeful spirit can be found, but that its adoption will more surely yield the results desired than any straining after extreme measures under the influence of wrought-up feelings. The main thing is the recognition of the evil, and he would be bold indeed who should say that this had not been brought about.

Municipal Engineering on the European Continent

THE inaugural Address delivered in London, November 18, 1904, by Mr. W. H. Lindley, M. Inst. C. E., as President of the Junior Institution of Engineers, has been published in separate form by that English association and constitutes an admirable record of municipal developments, especially in Germany, during the last four decades. As an English engineer practicing in Germany and the eldest son of the late William Lindley, well remembered in connection with the sewerage works of Frankfurt-on-the-Main, the author's qualifications for a work of this character are almost unique. The following extract from the Address is selected as giving a concise account of changes which have occurred within the lifetime of an observer still in his prime; among these, perhaps, none is more significant than the tendency towards municipalization in a country which, however well adapted for it by the paternal system of government in vogue, has not usually been credited with an inclination to swerve from the beaten track:

"You will have noticed from what I have laid before you this evening that by far the greater number of the works mentioned are municipal undertakings, and where water-works, gas works, tramways, etc., have in former days been confided to the hands of private undertakings, it has in many cases become the duty of municipal engineers to treat with the same and to draw up agreements for taking the works over by the municipality. As a rule these municipal works give a good revenue and very frequently a surplus which is utilized to lighten the burden of direct taxation.

"You will further have seen that the demands on municipal engineers on the Continent are great and numerous, and also the consulting engineer, who follows up certain specialties, has to give his advice on a great variety of subjects. These engineers in Germany, however, are greatly assisted by the circumstances under which they work; the Mayors and Councillors (Bürgermeister and Stadträte) of the cities form a body who make municipal questions a special study, and once in this line they devote their lives to this profession of administration. They are, as a rule, elected for twelve years; they can thus learn, acquire knowledge of the local conditions, and apply what they have learnt; and you will find them working hand in hand with the engineer to forward the development of the city in a most excellent manner.

"And now to conclude. You will have seen that at the beginning of the period to which I have referred, English influence was to a preponderating extent noticeable in these municipal works. English engineers were at the head of water-works and sewerage works carried out, which were in many cases capitalized by companies of English origin. After the first works had been constructed on English lines, the natural resources and requirements of the country were more and more recognized and Continental systems, adapted to the same, were evolved, for instance: ground-water supply, systematic deep sewerage, house drainage on the non-disconnecting system, etc. The Continental engineer continues to look around and to study what is done in other countries, and among these in Great Britain. He has brought over and introduced the refuse destructors from

England and further developed the same, and excellent works of this kind are carried out in various German cities. Now he is following up the biological treatment of sewage, adapting it to the conditions of his own country. In many of these works great advances have been made which will merit careful study on the part of British engineers. On the other hand the science and system of electric supply has been independently developed to a very high standard in Germany, and German electrical engineering stands in the foremost rank."

New York's Water Supply

AN important stage in the work of providing a large addition to the water supply of New York City has been reached in the presentation of a preliminary report by the Commissioners of the Board of Water Supply appointed by Mayor McClellan on June 9 last. The plan recommended contemplates the abstraction of 500 millions of gallons a day from the Catskill region, involving the construction of an aqueduct 117 miles in length, measured from its head to a point in Richmond. The volume named will be in addition to the 300 millions of gallons derivable from the Croton watershed, and it is estimated that the aggregate supply will provide for the city's needs for a period of twenty-five to thirty-five years.

A leading feature of the project is the construction of an enormous impounding reservoir in the Esopus valley, with a capacity of 70,000 millions of gallons, this being 7,000 millions in excess of the volume storeable in the Wachusett reservoir of the works supplying the Metropolitan district of Boston. The new reservoir will furnish one-half of the total additional volume kept in view, and further reservoirs in the Catskills will be required to secure the remainder. But the conduit is to be made of full capacity for the entire volume, thus confining future work to the development of the watershed.

It is estimated that an outlay of \$112,000,000 will be required for the first installment, to be supplemented, later, by an expenditure of \$49,000,000 on account of the ultimate volume. The inhabitants of the city and suburbs will be relieved to know that the scheme includes the filtration of the entire supply. Scarsdale, about four miles below Kensico, has been selected as the location of the large plant required for this purpose, and provision is made for securing the proper distribution of the filtered supply to the separate districts, but beyond the main lines for securing the water and delivering it "at the city's gates" nothing really coming under the head of distribution is included in the Commission's plans. Special consideration has, however, been given to the urgent necessities of Brooklyn, which cannot "properly be asked to wait for the new supply from the North." It is proposed to meet present needs by extending the present water system on Long Island, but it would seem, from statements in the report of Chief Engineer J. Waldo Smith, that Brooklyn has an internal task in this connection in bringing down the consumption to limits more easily dealt with than the present enormous demands on the system. Mr. Smith says, on this point, that "the water supply in Brooklyn during the past season is almost without

precedent in the history of a large American city. The consumption so outran the supply that there were hours in the day and even days at a time when houses on upper levels are said to have been deprived of a public water supply. In the course of this shortage resort was of necessity had to the throttling of gate valves in street distributing pipes to lessen the pressure and choke the draught, so that in many parts of the city water could not be drawn in the upper stories of dwellings during the working hours of the day. This throttling of water gates invites a conflagration which is not pleasant to dwell upon."

Mr. Smith's recommendations are supported by the consulting engineers of the Commission, one of whom, Mr. John R. Freeman, signs the report. The others, Prof. Burr and Mr. E. P. Stearns, are at present engaged as special engineering experts in examining the Panama Canal proposition. The latter, it may be noted, is Chief Engineer, in charge of water-works, to the State Commission by which the Boston metropolitan works were constructed.

The Garbage Situation in Los Angeles

WE gather from the October number of "Municipal Affairs," the organ of the Municipal League of Los Angeles, that trouble is being experienced in that city owing to the continued resort to the contract system of garbage collection, the conditions being aggravated by the present contractors having "undertaken the work at a figure that would not allow a thorough job." The League urged the City Council, two years ago, to terminate the contract and make a fresh start, but without effect, and its organ reflects the opinion of the League in stating that "there are City officers who seem to think that the City has done a good thing when it accepts a contract at a figure so low as to make its honest carrying out an impossibility." Details of the neglect of elementary rules are such as to justify all the condemnation heaped upon the present system, the cost of which, due to successive additions to the contract terms, is now \$100 per working day. As a new system is in contemplation the opportunity is taken to contrast the expenses of other cities with that figure. "Let us see," says our contemporary, "how the expenses of other cities run in comparison with our own \$100 a working day, or \$31,000 a year:

	Population.	
Milwaukee	300,000	\$181,000
Washington	300,000	121,000
Newark	255,000	70,000
Indianapolis	185,000	42,000
Rochester	170,000	106,000
Syracuse	120,000	66,000
Lowell, Mass.	95,000	33,500
Cambridge, Mass.	95,000	56,400

"On the other hand, there are cities, like San Francisco and Minneapolis (until recently), where the expense of collection is charged to the householder; and other cities, like Denver and Omaha, where the garbage, collected free of cost by farmers, is fed to hogs; and there are cities like Cincinnati, where the city merely makes a bluff at collecting the garbage, and the money allowed for the work is mostly

political graft. In such cities the sum is kept down fairly low. The cities we have named run systems that actually do business, and it is on these figures that we base the assertion that we shall not escape a charge much greater than any we have been paying, if we are to have the work done properly."

The population of Los Angeles, it should be added, is 200,000 and, on the basis of a three years' contract, it would be fair to assume an average of 225,000 for the contract period. The new system will have the advantage of a Decarie incinerator, which is to be ready by the first of the coming year and is guaranteed to destroy the garbage at a cost of not more than twenty-seven cents a ton, but the conclusion is reached that a total cost of \$4,500 per month must be faced—not far from double the expense of the present inefficient service.

A Patent Law Decision

A DECISION of more than ordinary interest has been given by Judge Brown, in the Rhode Island U. S. District Court, in regard to an application by the Pennsylvania Globe Gas Light Company for a preliminary injunction against the Cleveland Vapor Light Company. The patent relied upon by the complainant Company was issued to H. C. Campbell in 1891, and relates to the injection of a hydro-carbon fluid, in a heated and vaporous condition and under a considerable pressure, through a Bunsen burner, there combined with atmospheric air and rendering incandescent the refractory body against which the stream is then thrown. The refractory body referred to is, of course, what is now widely known as a mantle, the use of which greatly intensifies the light produced. The patentee aimed at a deviation from ordinary practice, at that time, in using gasoline vapor in place of coal gas, and it had been contended by the complainant Company, in earlier stages of the litigation, that Campbell was the first to devise a Bunsen burner, using gasoline as a fuel, capable of raising a Welsbach mantle to incandescence, and that the only element of Campbell's invention that was old was the mantle. Judge Brown, in refusing the application for an injunction, stated that "such a contention hardly could be made successfully in the face of the exhibit presented at the hearing of this motion," the defendant Company having heated a mantle to incandescence with a plumber's torch, used for removing old paint.

The Cleveland Vapor Light Company, it is gathered from the pleadings, did not deny infringement if the patent were shown to be valid, but set up, in this connection, the contention that a prior art existed, differing substantially from that shown in the earlier litigation. The Company also produced a number of patents for lamps burning gasoline vapor in a Bunsen burner, notably the English patent of Thomas Cooper, whose specification presented itself to Judge Brown as "a strong anticipatory reference as to Claim 1 of Campbell's patent for a method." On the other hand, he felt that there was force in the complainant Company's criticism that "it does not appear from the Cooper specification that he intended to use upon his Bunsen burner a dome of wire gauze similar to that used in the Welsbach device and in the Campbell device." This, how-

ever, did not deter him from refusing the Pennsylvania Company's application for an injunction, as already noted.

The Management of Public Utilities

THE plan propounded by Mr. James Montgomery Rice, in the September number of the MUNICIPAL JOURNAL, for the management of public utilities has evoked considerable comment, including some criticism in the "Illinois State Register," to which Mr. Rice has replied. He claims that his plan is unique only in combining the good points of each of two well-known systems and eliminating most of the evils of both. The "Record" having suggested difficulties in regard to the controlling influence of the general body of taxpayers, Mr. Rice retorts that "it is a sort of bitter sarcasm to say the taxpayer has anything to say about the management of public utilities under present methods. Public utilities are turned over to money-making private corporations under a franchise running from twenty-five to ninety-nine years, under which conditions the city has far less control than it would have in giving a lease or franchise or contract or whatever it may be called to a corporation—not for pecuniary profit—which lease might run from four to twenty years. Every right of the city would be protected in that lease or franchise, which would provide that the lessees or managers should pay the city a rental equal to 5 per cent. of the cost of the works, should keep the works in good repair and provide a sinking fund for their replacement when they are worn out."

LETTERS TO THE EDITOR

Sewage and Garbage Disposal for New York

The Editor, MUNICIPAL JOURNAL AND ENGINEER:—

IN 1899 I submitted plans to the New York Dock Commission for utilizing the space within the piers, between high and low water, for putrefactive action upon the solid organic matter in the sewage, this action to take place in properly built tanks. These solid matters are at present largely precipitated and find permanent lodgment upon the bottom of the harbor, whereas by the proper construction of the outfall sewer extending to the outer ends of the piers this matter can be liquefied, gasified, partially purified and discharged into the harbor as practically pure water without causing offense. The gases emanating from the matter in the tanks can be eliminated by combustion in a suitable apparatus or carried by a ventilating shaft to a safe elevation.

The chief objection to the plant was that if the sewage was purified before it reached the harbor it would not preserve with its poisons the wooden piles forming the piers from the depredations of the *Teredo navalis*. At the time, this point seemed well taken from the standpoint of the engineers entrusted with the construction and maintenance of the piers, if not from that of the engineers entrusted with the care and preservation of the harbor from permanent injury by the deposit therein of the solid matter in the sewage.

The use of metal and concrete piles removes the only objection except that of cost to the scheme.

It was estimated at the time that these tanks, in sufficient numbers to serve the whole population living near the har-

bor in Greater New York City and New Jersey, could be constructed for from \$4,000,000 to \$16,000,000, according to the form of structure used, whether the Glover 1882 apparatus or the Glover 1896 apparatus, the later and most perfect type costing most money to build. Either apparatus, if generally used, would arrest and retain yearly about 4,000,000 tons of sludge which would otherwise be deposited in the harbor and must eventually be removed at a much larger cost than that of keeping it out in the first place.

It is stated in Mr. W. F. Morse's paper, published in the October MUNICIPAL JOURNAL AND ENGINEER, that the Boroughs of Manhattan and Bronx have yearly 200,000 tons of garbage to dispose of at a cost of \$250,000. The putrescible and offensive organic matter in this garbage can be deposited in the same tanks with the sewage and subjected to the same putrefactive action, with the resulting elimination of the solids and the escape only of the liquids.

The City of London experimented for five years with this system of sewage disposal before the authorities were convinced of its efficiency and adopted it to purify the River Thames. It is generally in use in the boroughs about Manchester, draining into the Irwell and the Mersey.

It is a matter of engineering only, when a new pier is being built or an old one rebuilt, to adapt it to the putrefactive decomposition of the solid matters in the sewage and garbage; thus, in time, the two great problems of sewage and garbage disposal could be settled to the advantage of present and future New York, the cost being distributed over the time required for the permanent construction of the piers.

The space suggested belongs to the City and cannot well be used for any other purpose. JOHN N. MCCLINTOCK.

643 Old South Building,

Boston, Mass., October 9, 1905.

Garbage Reduction v. Incineration

WE gladly give publicity to the enclosed correction, by Mr. Howard G. Bayles, C. E., of New York City, in regard to our reference to his Montreal Convention paper, page 184 of the October MUNICIPAL JOURNAL:

Editor MUNICIPAL JOURNAL AND ENGINEER:

Dear Sir—I should be grateful for an opportunity to correct publicly an error that somehow crept into your October number. With reference to my paper at the Montreal Convention of the American Society of Municipal Improvements, I find that I am quoted as having criticized with especial severity the Cleveland garbage reduction plant. The allusion should have been to the works at Columbus.

At that time I had not visited the Cleveland plant. Having done so since, I find myself still unconvinced that incineration is not the best method of final disposition.

October 13, 1905.

Convention Dates

December

—American Economic Association, Baltimore, Md., December 26-30.—Frank A. Fetter, Morrill Hall, Ithaca, N. Y.

Personalities

—Mr. W. P. Cain, City Engineer of Leadville, Colo., has resigned.

—Mr. E. H. Randall has been elected City Engineer of Fredericksburg, Va.

Mr. Wallace McDonald, City Clerk of Beverly, Ont., for forty years, has resigned.

—C. J. Woodside, Mayor of Chickasha, I. T., has resigned on account of ill health.

—Mr. T. O. Morris has been elected Mayor of Nashville, Tenn., and Mr. Hill McAlister, City Attorney.

—Mr. Howard Thomas, City Engineer of Superior, Wis., has resigned to enter on private practice. He is succeeded by Mr. S. M. White.

—Mr. Charles H. McCormick, President of the Board of Water Commissioners, New Brunswick, N. J., died at his home in that city, September 13, at the age of sixty years.

—Mr. Holmes Hollister, Superintendent of the Water Department of Ithaca, N. Y., has resigned on account of ill health and will be succeeded by Mr. Frank L. Getman. Mr. Hollister will remain as a Commissioner.

—Mr. P. H. Porcheron, City Engineer of Rome, N. Y., has resigned to accept an engineering position under the Government at West Point. He is succeeded by Mr. John L. Plunkett, formerly Assistant City Engineer.

—Alderman William K. Reynolds, who, as President of the Council, has succeeded the late Mayor of Providence, R. I., has had nineteen years' experience in the work of the city and is thoroughly imbued with its importance from a public point of view. The sudden death of his predecessor is referred to on the next page.

—Hon. W. L. Frierson has been elected Mayor of Chattanooga, Tenn., with practically no opposition. He was born at Shelbyville, Tenn., in 1868, and was admitted to the Bar in that city in 1889, removing to Chattanooga the year following. He is a member of the law firm of Shepherd and Frierson and is recognized as being in the front rank of his profession.

THOMAS H. CARR, MAYOR OF MONTGOMERY, ALA., died at his home in that city early on the morning of October 1st, after an illness of about ten months. He had undergone an operation in Chicago and his recovery was expected by his friends. After his return home he visited the seashore, but again returned to Montgomery to escape the yellow fever quarantine.

He was a leading candy and cracker manufacturer and had built up a trade that will insure an ample income for his family. In 1903 he was elected Mayor and his administration has been progressive. As he took office in the middle of October he had only two weeks to serve, when he would have been succeeded by Mayor-elect W. M. Teague.

THE MAYOR OF HARTFORD, MR. WILLIAM F. HENNEY, on his return from a tour in England and Scotland, during which he devoted special attention to the operation of municipal utilities in Glasgow, has been interviewed by a representative of the local "Times." Commenting on the views expressed by Mr. Dalrymple since his visit to Chicago,

the Mayor described them as being "to the effect that the American city must equip itself with a simple business charter before undertaking any such enterprise, and that a city government founded upon the varying fortunes of party politics, administering the patronage from such sources, would soon become an intolerable tyranny, exercised by discerning and self-seeking men."

AUGUSTUS S. MILLER, Mayor of Providence, R. I., died of heart disease at 1:30 A. M. on September 26th, while conversing with friends at the Hope Club in that city. He was born in Plainfield, Conn., in 1847, graduated from Brown University in 1871 and was admitted to the Bar of Rhode Island three years later. He entered into partnership with Judge Arthur L. Brown, a member of the United States Circuit Court, and former Congressman Henry J. Spooner. This firm was dissolved, however, and he later formed a partnership with Attorney Carroll. From 1881 to 1887 he served in the Common Council and in 1903 was elected Mayor on the Democratic ticket, holding that position up to the time of his death. He is survived by a widow and a son, William D., a student at Brown University.

Fire and Police Personals

—E. E. Smith has been elected Chief of the Fire Department of Islip, N. Y.

—James Maskele is the new Chief of the Fire Department of Watervliet, N. Y.

—Franklin Gilkeson has been elected Chief of the Fire Department of Bristol, Pa.

—William Mattice has been elected Chief of the Fire Department of Catskill, N. Y.

—George Emeur has been elected Chief of the Fire Department of Newtown, L. I., N. Y.

—Charles M. Hauser has been elected Chief of the Fire Department of North Yakima, Wash.

—Stanley W. Manning has been elected Superintendent of the Fire Alarm Telegraph system of St. Paul, Minn.

—Joseph M. Harmon has been elected Chief of Fire Department, Etna, Pa., succeeding A. B. Andres, resigned.

—Chief of Police Illance, of Cienfuegos, Cuba, was shot and killed, September 22, while in the performance of his duty.

—W. T. Cox, former Chief of the Fire Department of Elizabeth, N. J., has been re-elected President of the Board of Fire Commissioners for the fifth time.

—Charles J. Lauer, Chief of the Fire Department of Columbus, was elected President of the Ohio Association of Fire Chiefs; Fire Chief W. H. Lawler, of Youngstown, First Vice-president; Fire Chief Hartung, of Sandusky, Second Vice-president; Chief Heffner, of Elyria, Third Vice-president; Chief Buckmeyer, Chillicothe, Fourth Vice-president; Chief D. K. Mosier, of Warren, Secretary; and Chief Sam F. Hunter, of Springfield, Treasurer.

—Aaron J. Henry, of Allentown, Pa., was elected President of the Pennsylvania State Firemen's Association at the Convention recently held at Scranton. Other officers elected are: Thomas E. Jones, Pittsburg, First Vice-president; Bernard Bosch, Oaklane, Second Vice-president;

John L. Lewis, Lansford, Third Vice-president; F. J. Connerly, Newcastle, Fourth Vice-president; W. W. Wunder, Reading, Recording Secretary; J. A. Green, Carlisle, Corresponding Secretary, and C. L. Reichenbach, Allentown, Treasurer.

THE AMERICAN PUBLIC HEALTH ASSOCIATION held a successful Convention in Boston, September 25-29, the first day being specially devoted to the Laboratory section. This being the thirty-third annual reunion of the members, it is hardly necessary to refer to the Association as being the oldest body of this special character in this country, and the continued accession of public health officials from various parts of the world affords evidence of the estimation in which its work is held. At the same time, it would be difficult to describe the Association as being in close touch with popular sentiment in regard to matters in which interest is now, happily, no longer confined to specialists, and it may be taken as a hopeful indication in this respect that the growing importance of the Laboratory section may admit of the general body devoting a larger share of attention to municipal sanitation in its broader aspects. The training of health officials is already receiving much attention in the Association's work, and the contact thus established between the scientific and administrative sides of hygienic effort can scarcely fail to bring about that closer affinity with popular ideals which is so desirable in any field of work in these later days.

A GRATIFYING REDUCTION IN THE WASTE OF WATER is indicated by figures given in a report of the Lewiston, Me., Water Board for the year ending February 28th. The report of Superintendent Cyrus M. Lunt states that the average daily consumption for the year was 461,512 gallons less than that for the previous year, and adds that "a gradual adoption of the meter system is the only available preventative to check waste and illegal use until the time arrives when the users and the public shall recognize that water from the city mains is merchandise as much as milk, ice, coal or any commodity." He draws attention to the unnecessary addition to operating expenses due to the cost of obtaining and delivering the volume wasted beyond that required for legitimate use, this being of special importance in cities where, as in Lewiston, the supply is pumped in whole or in part.

CIVIL SERVICE RULES, as applied to the employment of ordinary laborers, are exerting an effect in Binghamton, N. Y., which has already been felt elsewhere. Under the rules there in force, no laborer can be employed by the City unless he has registered with the Civil Service Commission, and as laborers have not registered in adequate numbers it was found that fourteen unregistered men were at work on a city sewer. If they are laid off, the work will have to stop, and City Engineer S. M. Baird is quoted as saying that the City will have to abandon sewer construction, which will then have to be let to contractors, who are not placed under this disability in regard to foreign labor. In any case, he says, the cost of sewer construction will be raised far above the present rates.

A YEAR'S WORK IN TORONTO

THE annual report of Mr. Charles H. Rust, M. Amer. Soc. C. E., City Engineer of Toronto, Ont., for the year 1904 contains data of interest and value to all students of municipal problems. One of its striking features is a comprehensive statement giving in concise form much information in regard to population, area and other conditions which, as we have only too good reason to know, is frequently omitted from documents of this nature.

The land area of the City is seventeen and one-half square miles and the population is given as 293,395 at the end of the year. Of the total area, 1,460 acres are accounted for by twenty-one parks. There are 265 miles of streets and eighty-four miles of lanes, 190 miles of the former being paved. Of the pavements used, macadam and cedar block come first, with about fifty-four miles of each; asphalt is next with a total of fifty-two miles, and the others are as follows: brick, fifteen and one-half miles; gravel, nearly six miles; tar-macadam, four miles; bitulithic, one and one-half miles; stone and scoria block one mile, and wood on concrete foundation, a quarter of a mile.

An interesting item of municipal practice is touched upon in the following extract from the report: "The practice of the City Engineer tendering upon all works in competition with contractors has been carried on with satisfactory results. The City Engineer's tender was [in 1904] the lowest on fifty-nine contracts, and twenty-two were done by order of the Council without calling for tenders. Of the total, sixty-four were carried out by day labor under his supervision, the remaining seventeen being constructed by contractors at the figures of this Department." On the work performed by day-labor the Department made a saving of \$6,545.

In 1904 there was a decrease in the cost of asphalt pavements, due mainly to the prevailing keen competition. The cost of heavy and light asphalt pavements for the year was \$2.23 and \$1.65 per square yard respectively, as opposed to \$2.54 and \$2.05 per square yard in 1904.

A total of about fifteen miles of pavement was constructed in 1904, and the sidewalks laid amounted to thirty-one miles, the latter being either of concrete or brick. A less extent of pavement was constructed than in the previous year, but the loss was in the less permanent classes, while, notwithstanding the aggregate reduction, asphalt nearly held its own and bitulithic showed an increase of 94 per cent. Of the asphalt pavements laid, eight were heavy and twenty-five were light, aggregating 34,475 square yards of the former and 53,455 square yards of the latter. The length of these pavements amounted to six and one-third miles, or 51 per cent. of all pavements constructed.

The construction of tar-macadam pavements showed a marked falling off in the year. In 1901 one roadway of this class was constructed; in 1902, six; in 1903, eleven and in 1904, eight. The total length laid last year was under one mile, as compared with over two miles in 1903, these statements indicating, as pointed out in the report, "the rapid rise and threatened fall of tar-macadam roadways in the

opinion of Toronto's ratepayers." Streets on which the greatest care had been taken with tar-macadam construction, both as to the material and the methods of heating and mixing, showed signs of disintegration of the surface within a month after completion. Experiments in regard to this defect have led to the proposal to increase the thickness of the foundation course from four to five inches, to eliminate the intermediate course and increase the thickness of the wearing surface, "the crucial factor," from one to three inches. Stone is to be selected of sizes which will give the greatest aggregate density, *i. e.*, yielding the smallest percentage of voids. For simplicity, the three sizes determined upon are one and one-half and one-half inches and screenings of crushed rock varying in size from dust to one-quarter inch in greatest dimension. "A mixture of these three sizes of stone in the proportion of two parts of one and one-half-inch stone, one part of one-half-inch stone and one part screenings is found by careful experiment to give an almost perfectly dense aggregate and is adopted as the specified proportions to be used. Actual tests have been made, using the above proportions of stone and varying mixtures of tar and pitch, under conditions which exist on street work, and the results give promise of a pavement in all respects satisfactory, including the matter of cost.

It is proposed to continue the use of brick gutters and concrete curb in connection with tar-macadam pavements." The Engineering Department has almost entirely discontinued the use of stone curbing in connection with asphalt pavement in favor of concrete, which, the report states, "results in considerable saving in the cost and gives equally good results." During the year the only stone curbing set, amounting to forty-eight linear feet, was used to replace damaged curbing of the same material, as compared with a total of 33,425 linear feet of combined concrete curb and gutter and 20,000 linear feet of concrete gutter. In addition, a total of 68,000 linear feet of concrete curb was laid in connection with concrete sidewalks. There are 426 miles of sidewalks, of which 275 miles are of wood and 146 miles of concrete.

In the construction of brick pavements difficulty was found in securing bricks from the local companies and they were purchased in the United States. Owing to the rise in price of Canadian bricks, the Department is considering the plan of purchasing paving blocks from the United States, "the lifetime of these blocks being longer and the cost very little in excess."

The sewerage of the City is on the combined system. Of the 240 miles of sewers, a total of 12,500 feet was constructed in 1904. Twelve of the sewers were constructed by day labor; for five of these the City Engineer's tender was the lowest submitted; in three, his tender was the only one received, and the other four were constructed without calling for tenders. By taking the actual cost from the estimate of the lowest contractor it is shown that the City, on four sewers, saved \$634.

It is proposed to increase the depth of concrete under the

rails of the street railway tracks from eight to twelve inches and to adopt a ninety-pound grooved girder rail of new design with welded joints, a line of granite setts or paving blocks being laid as a stringer on each side of the rail, the T-rail to be gradually abandoned. The report states: "The adoption of concrete in track allowance surface should not be encouraged, because, except in the most recently constructed tracks, easy access to the rail fastenings and tie-rods at any time is essential to the keeping of the track in any kind of proper shape, and it is more difficult to cut and repair a concrete surface than either a brick, scoria or granite sett pavement. And, besides, a concrete surface becomes dangerously slippery when subjected to the heavy traffic which naturally exists on any street having street railway tracks."

The cost of the scavenging service in Toronto as compared with that in some of the principal cities in the United States has given rise to discussion. The report points out that, in the latter, garbage only is removed, while ashes are disposed of by the householders. Moreover, in some of the cities referred to garbage is exclusively kitchen or table waste, while in Toronto it covers, in addition, all combustible materials, such as waste paper, store sweepings, manufacturers' waste, dead animals, old mattresses, etc. On this subject the report states: "I am fully convinced that if the same classification was made here as is done in most of the American cities and towns, the garbage so-called would be diminished fully 50 per cent., which would reduce the cost of the service at least \$10,000, that is, figured out on the

average cost per load collected." It is shown that, owing to the differences existing, it is impossible to make an accurate comparison between these cities and Toronto in the matter of cost.

The City has 273 miles of water mains and nearly 51,000 services, and has in use 2,043 water meters. In April, 1904, it was resolved to include in a bond issue \$50,000 for the purchase of additional meters. There are 43,000 customers, and the rates are, "Average schedule, two and one-half cents per 1,000 [Imp.] gallons, and by meter, ten cents per 1,000 gallons." From figures given in the report it appears that the average consumption per capita per day amounts to 102 U. S. gallons.

The City is lighted by three companies, one of which has 295 miles of mains and about 39,000 customers; another, 1,220 electric arc lights, 750 private business arc lights and 150,000 private business incandescent lights, 960 miles of overhead and underground wires and fifty-five miles of underground conduit; and the third, 964 street lights.

The Toronto Street Railway Company, operating under an exclusive franchise, as explained in detail on page 151 of the October MUNICIPAL JOURNAL, has about ninety-one miles of tracks and 305 cars in use and in 1904 carried sixty millions of passengers. Actions had been brought in the Courts to compel the Company to comply with the time table, made up by the City Engineer with the approval of the City Council, as there was a great deal of overcrowding during the rush hours, and to construct a number of track extensions ordered by the City Council.

BREAKAGES IN PIPE SEWERS

IN a paper read before the Sanitary Section of the Boston Society of Civil Engineers on October 4, Mr. Alexander Potter, well known as a New York consulting engineer, dealt with a subject as obscure as his manner of treating it was the reverse. The breakage of sewer pipes, occurring after the completion and backfilling of the work, is among the most perplexing and annoying of the experiences which fall to the engineer's share in ordinary work, and there is much truth in Mr. Potter's statement that an engineer is reluctant to make known the existence of such defects unless absolutely necessary in the interests of the work. This fact is partly responsible for the obscurity to which we have referred, and in attempting to lift the gloom Mr. Potter has earned the thanks of many within and without his own profession.

The necessity of discriminating between the earlier uses of vitrified pipe and those to which it is now mainly applied is enforced in one of the opening paragraphs of Mr. Potter's paper. Instead of being laid with open joints, regardless of the amount of leakage in either direction, modern pipe conduits are laid with an eye to securing the tightest joints attainable in practice, and to that end are cemented together into a continuous and inflexible cylinder, with no facility for yielding except at the cost of the cardinal requirement just named. Where the pipe is laid in dry sand,

loam or clay free from water, the good foundation which it is possible to secure removes the difficulty of apprehended settlement, but a very different state of affairs is presented in rock cuts and wet trenches. It is safe to assume, says the author, that ground-water in pipe sewer trenches, properly dealt with, at least doubles the cost of the sewer; he discusses the precautions usually taken, some form of under-drain, involving disturbance and weakening of the natural foundation, being inevitable. It is at this point that danger first presents itself, for, as Mr. Potter very properly points out, the usual methods of replacing excavated material around pipes are not adequate to secure freedom from cracking or collapse, at any rate in the larger sizes of pipe. The phraseology of many specifications is roundly scored, it being impossible, in many trenches, to ram back the removed material with any tool, and it is equally futile to expect ordinary workmen to appreciate the importance of that and other stipulations.

The experience gained by Mr. Potter in the construction of 145 miles of sanitary sewers in the New Jersey joint sewerage works, recently completed, is freely drawn upon in the paper; no better illustration of the difficulties due to unfavorable ground could be cited than an undertaking in which two-thirds of that great length was in drift saturated with water, involving therefore the objectionable disturb-

ance of the natural bed on which the pipes would otherwise rest. In this work an endeavor was made to reduce the risk of settlement and consequent leakage, besides lowering the cost, by substituting a yielding foundation, on timber cradles, for the usual under-drain and its concomitant rigid filling. The cradle was formed of four 2-inch by 4-inch longitudinal timbers laid flat in the trench, two clear inches in width being left between each pair. Transverse 4-inch by 4-inch pieces, nailed to these at 18-inch intervals, served to support the 3-foot pipe lengths, which were held in place by wedges nailed to the cross-pieces. The ground-water flowed along the 2-inch spaces left for it, and thus saved the provision of a pipe while affording the advantage of a slightly elastic bed for the sewer, but this form of construction left a greater area under the sewer pipe to be filled up, and in that respect was objectionable. And in spite of all that was done, in this and other ways, to secure good results ruptures occurred and had to be dug down to, the defective pipes being either replaced by others or surrounded by concrete. In cases cited by the author, the depth of the trench was frequently under eight feet, so that no question of collapse, due to excessive loading of the standard pipe used, could enter into the discussion.

Examining the breaks in detail, it was found that twenty-four breaks, aggregating 1,500 feet, occurred in 26,303 feet of 24-inch pipe, mostly in gravel or rock cuttings, none happening in quicksand. A peculiar feature of the breaks was that in trenches varying from six to twenty feet in depth more broken pipes were found in the shallower sections. The timber foundation showed up well in this five-mile length and still better in a 22-inch pipe section, 8,197 feet in extent, much of it on timber, not a single cracked pipe being found, although laid at the same depths as the 24-inch pipe. In a long stretch of 20-inch pipe, the fourteen breaks found were all in rock cuttings where the pipes had been temporarily supported on blocks pending the ramming in of selected material under them.

As regards the preventive measures best adapted to the evil, Mr. Potter believes that the only safe method is to fill the space under the pipe and up to one-third of its height with concrete, which need not be rich in cement, or, if the pipes be so jointed as to stand it, to fill up to the top of the pipe with fine sand and then puddle this entirely under and around the pipe by flooding with water. But the cost of concreting is a serious item and is to be counted among the considerations which, as he points out, tempt engineers to take chances when carrying out pipe sewer work. He makes the statement that in the New Jersey work, costing \$1,680,000 in all, a further cost of \$125,000 would have been incurred if concreting under all pipe in wet trenches had been resorted to, while the total cost of replacing the broken pipe did not reach \$5,000. It is true that only a partial remedy was thus effected, but the leakage was reduced to 15 per cent. of the capacity of the entire system.

A curious complication is introduced into the design of sewers, in which it is attempted to make allowance for leakage, by the fact that if its volume be taken as increasing directly with the diameter of the sewer each increase in size will automatically introduce a factor calling for a further increase.

Mr. Potter confesses his inability to account in each case for the cause of the breakage, and cites some remarkable instances of diametrically opposite results under what were believed to be identical conditions. But he has arrived at the conclusion that the larger sizes of vitrified pipe, say 20-inch and above, should not be used in sewer construction unless on a concrete base, and that the cost involved should be a factor in determining the type of construction to be recommended. On smaller sizes, the use of a concrete bed should be far more general than it now is. He concludes his interesting and thoroughly practical paper by urging other engineers, as well as contractors, to discuss and criticise his statements, believing that this will best conduce to the spread of knowledge on the subject.

AN ENGLISH SEWAGE REPORT

THE operation of the Manchester (England) sewage disposal works possesses a special interest for foreign engineers in the fact that the plant offers the most conspicuous, if not the only, example of successful bacterial treatment by single contact on an admittedly large scale. Nor can it be said that the prevailing conditions are such as to favor this result, for the effluent is discharged into the ponded water of the Ship Canal between Manchester and Liverpool and must comply with standards of purity imposed in the interests of that undertaking and the public health generally. The climate of Lancashire is another feature militating against the easy manipulation of the gross volume of sewage contributed by an estimated population of 575,600 for the year ending March 29, 1905—the period covered by the latest report of the Rivers Committee of the Manchester City Council. This consideration arises less from the aggregate depth of rainfall—twenty-seven inches during the excep-

tionally dry year under review—than from its distribution over rather more than one-half of the total days of the year, to be exact, 190 days. Added to this is the circumstance, common to nearly all British sewage works, that the contributory sewers are on the combined system, as contrasted with the American tendency towards the exclusion of rainfall.

The present plant is an adaptation of earlier works for chemical precipitation, which first came into operation in 1904. Their failure gave rise to much discussion by eminent experts, and the changes finally recommended are on the point of completion, the entire flow of sewage being now dealt with by bacterial methods. Chemical treatment, which has been gradually diminished, was finally given up on August 4, 1904. "The sewage, as it reaches the works, passes through a system of screens and catch pits, designed to intercept coarser floating matter and heavy detritus. The

flow is either passed through open septic tanks on to the half-acre bacteria beds, or, after simple sedimentation, on to the storm beds." The sludge accumulating in the septic tanks is conducted into channels leading to two ejectors, which force it into two storage tanks near the banks of the Ship Canal, whence it flows by gravity into a specially designed sludge steamer, which deposits it at sea beyond the Mersey Bar.

A total of 103 acres is occupied by the tanks and other works, an additional area of 80 acres being partly taken up by existing roads, embankments, etc., and partly available for extensions of the primary beds. The Rivers Committee has, however, acquired an area of 295 acres further down the river, on which second contact beds and irrigation areas can be laid out when the necessity arises. With this contingency in view, an experimental half-acre bed, to receive sewage already treated by the plant, is in course of construction. It is found that the amount of suspended matter passing away in the filtrate resulting from the primary treatment is increasing, the average amount, for last year, being between three and four grains per gallon. In connection with this and other results it is important to remember that the design of the works contemplates the treatment of a volume equal to six times the dry-weather flow of sewage, this being one of the cardinal principles underlying the action of the central authority—the Local Government Board—in approving or rejecting sewage disposal schemes submitted for its sanction. In the case of Manchester, during the dry year now discussed, the excess of sewage delivered at the works, over this limit, amounted to 38 million U. S.

gallons, while in the previous year, with a rainfall greater by ten inches, it was over 141 million gallons. It is shown that 83.5 per cent. of the total volume of sewage reaching the works in 1904-5 was passed through the various beds before being discharged into the Ship Canal. The record in filtration returns was established during the week ending March 15, 1905, when a daily average of 52½ million U. S. gallons was thus dealt with. The daily average for the entire year was 30¼ millions.

The total cost for labor and incidental expenses was equivalent to seventy-nine cents per million U. S. gallons actually filtered. This does not include any sum set aside for future renewal or washing of the material of the beds.

The foregoing data refer exclusively to the works at Davyhulme, although there are works at Withington and Moss Side dealing with smaller areas incorporated with the city on November 4th last. The former will be continued, while the sewage now treated at the latter will be diverted to Davyhulme.

It has sometimes been stated, by American visitors to English sewage works, that there is a disappointing absence of skilled control, especially in the scientific examination of crude sewage and effluents. Without going out of our way to discuss that point, it may at least be said that the Manchester works afford no room for the reproach referred to, being under the superior charge of an eminent specialist in this department of research and practice, Dr. Gilbert Fowler, whose courtesies to the present editor of this journal, on visiting the Davyhulme works last year, have materially assisted in the preparation of this review.

WORTHY OF IMITATION

THE trouble experienced in many cities, due to the lack of uniformity in the methods and quality adopted for sidewalk construction, would be minimized by the general adoption of an ordinance such as that framed by the city of Milwaukee, Wis., as given below:

Section 1. No person, persons, firm, corporation, association or individual shall construct, lay, or rebuild any sidewalk on any public street, avenue, lane, alley or square within the said city without having first been licensed by the Board of Public Works of said city of Milwaukee.

Section 2. Any person, persons, firm, corporation, association or individual desiring to construct, lay or rebuild any sidewalk on any public street, avenue, lane, alley or square in the city of Milwaukee shall, before engaging in the work of constructing, laying or rebuilding any such sidewalk, make application to the Board of Public Works of said city for a license, which shall be issued to the applicant therefor authorizing such person, persons, firm, corporation, association or individual to engage in the business of constructing, laying or rebuilding sidewalks within said city, upon the payment of the sum of two dollars as an annual license fee, and which sum shall be paid into the city treasury.

The said Board of Public Works is hereby authorized and

empowered to make and prescribe such rules and regulations as it may deem necessary for the public interest concerning the manner of construction, laying or rebuilding sidewalks within the city of Milwaukee, and is hereby authorized and empowered to make and prescribe standard specifications for the method of construction of said sidewalks. All persons, firms, corporations, associations or individuals licensed by said Board of Public Works to construct, lay or rebuild sidewalks within the city of Milwaukee under the provisions of this ordinance shall be subject to such rules and regulations as may be prescribed by said Board of Public Works as hereby authorized; and such sidewalks shall be by the persons, firms, corporations, associations and individuals so licensed constructed in accordance with such standard specifications as may be duly adopted by said Board of Public Works under the power and authority hereby conferred upon said Board of Public Works.

Section 3. Any person, persons, firms, corporations, associations or individuals violating any of the provisions of this ordinance shall upon conviction thereof be subject to a fine of not less than five dollars, nor more than twenty-five dollars, or by imprisonment in the House of Correction of Milwaukee County for a period not to exceed sixty days.

Street Paving in Minneapolis

ACCORDING to the "Minneapolis Tribune," which discussed the present condition of that city's streets in a recent issue, it is intended to effect many improvements in this respect within the next few years in that city. This applies not merely to new work but to the re-laying of a number of important thoroughfares. "A number of the downtown streets that have been laid with asphalt are now in a bad way, and on the greater part of this pavement the guarantee of the asphalt company has already expired, so that any additional patching that needs to be done must be done by the city. But the City Engineering Department declares that the cost of repairing these streets would exceed that of re-laying the thoroughfare with some other kind of pavement." This observation is amplified by a specific reference to the Park avenue asphalt pavement, which "will need attention within the next few months." It is stated, also, that "this pavement is but two years old, and the manner in which it has already begun to show incipient ruts has rung the doom of the asphalt pavement in this city, according to the officials of the City Engineering Department."

It is believed that about \$225,000 can be made available for the contemplated work, but Assistant City Engineer Dutton asks, in an interview reported by the "Tribune," "How can the city of Minneapolis be a well paved city with such a small amount of money at the disposal of the Street Paving Department?" He also stated that "Minneapolis is one of the worst paved cities in the country. This miserable asphalt that is on our downtown streets gives the city a black eye from the start." He believes, however, in spite of the lack of funds, that "within a decade nearly all of the old wornout pavements will be replaced and the roads in first-class condition. City Engineer Andrew Rinker, in a later talk, stated that temporary help would be found in filling the worst holes, there being no sufficient means with which to repair all the holes and weak places. He thought that, under the present circumstances, the most practicable solution of the problem would be to have the entire asphalt paving of the city, amounting to about 110,000 square yards, re-surfaced by an asphalt company, under a ten-years' bond.

Reinforced Concrete Sewer

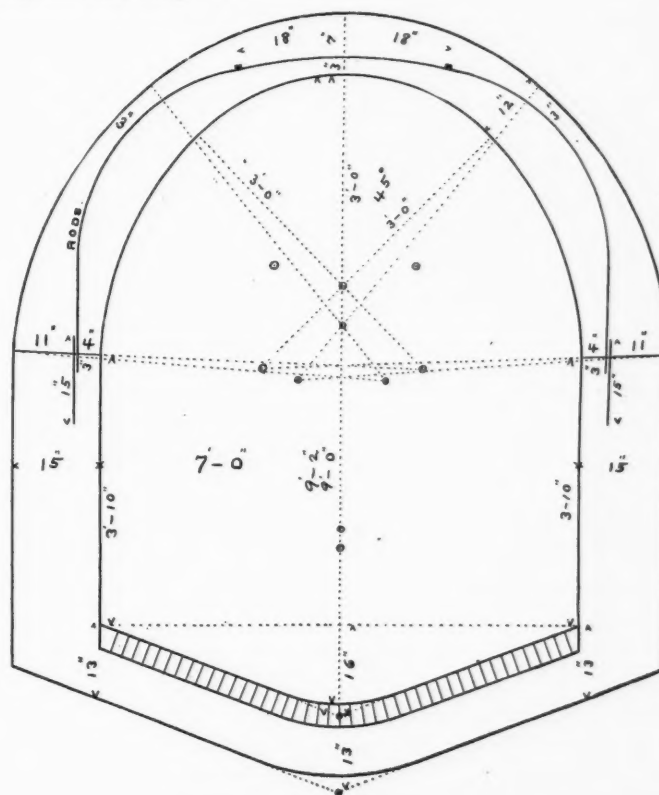
THE accompanying cross-section shows a type of reinforced concrete sewer, nine feet high by seven feet wide, constructed in Covington, Ky., from the design and under the supervision of Mr. W. E. Gunn, M. Amer. Soc. C. E., City Engineer.

The conditions to be dealt with were unusual, the present surface of the ground being, for the greater part of the length of 1,260 feet, level with the springing of the sewer arch. In addition, a surplus of strength had to be provided in view of the possibility of a railroad switch being located over the sewer at an elevation of about eight feet over the crown. The arch approaches a parabola in form and the special shape of the invert was adopted so as to concentrate the dry-weather flow in a small channel; it is computed that at all ordinary times this flow will not rise above the edges of the vitrified brick lining of which the invert

is built; this will consequently receive 90 per cent. of the wear. Beyond these considerations, facility of construction was borne in mind in determining the form of the sewer, the concrete in the bottom and side walls being easily rammed in.

The concrete used was composed of one part American Portland cement, two and one-half parts sand and five parts washed screened gravel varying from half-inch to two-inch gauge. Special care was devoted to the maintenance of these proportions, it being found that natural mixtures of gravel and sand varied widely in this respect. With concrete costing \$5.95 per cubic yard in place, the total cost of the sewer, with all accessories, is about \$10 per linear foot.

The rods, placed at intervals of fifteen inches along the sewer, are specified to be corrugated steel bars weighing 1 35-100 pounds per linear foot, 1 1/4-inch by 5-16-inch in cross-section. The longitudinal connecting bars are at least sixteen feet long.



CONCRETE SEWER, COVINGTON, KY.

MUNICIPAL OWNERSHIP IN NEW YORK is being used as a rallying cry in the election campaign now under way in that city. At a recent mass meeting a letter from Dr. Parkhurst was read, in which that well-known reformer expressed general agreement with the policy advocated by the local Municipal Ownership League. "Private ownership," he wrote, "might reasonably meet public requirements in respect to gas and telephones, but it does not and does not intend to. Such corporations, as we know them here in New York, do not exist to serve the public but to bleed the people; we ought at least tentatively to adopt a system of municipal ownership; only it is to be hoped that the man whose candidacy is to be put forward as representative of the scheme will be one of sufficient wisdom to appreciate its difficulties and of sufficient strength and dignity of character to command popular respect."

The Parks of Minneapolis

THE Board of Park Commissioners for the city of Minneapolis records its work for the year 1904 in a small volume which, in regard to matter, typography and illustrations it would be difficult to excel. We are indebted to the courtesy of Mr. J. Arthur Ridgway, secretary, for the three selected views now reproduced, and may note that the total cost of maintaining the city's parks and parkways during the year amounted to \$96,931. The annual accounts show a total expenditure of \$190,537, which includes the above sum and an item of \$48,058 for "improvements of parks and parkways" and another of \$8,207 for "expenses of land purchases from general fund," besides \$34,985 for interest on bonds. During the year the board acquired an additional park area of about fifty-five acres.

The report of the Superintendent, Mr. William M. Berry, shows that the city owns a fleet of 176 row boats, an electric launch and a sail boat, and that bath-houses were maintained at Lake Calhoun during the season. A prominent feature in the report of Attorney C. J. Rockwood is the danger to which growing trees are exposed when coming in contact with telephone and other wires, the proprietary corporations claiming the right to remove the tops and branches of the trees so far as is necessary to prevent such contact. He sees no way to protect the trees and permit them to have their natural growth unless the Board assert and succeed in maintaining the position that the wire companies must make such changes from time to time in their lines as will prevent any serious interference with trees.

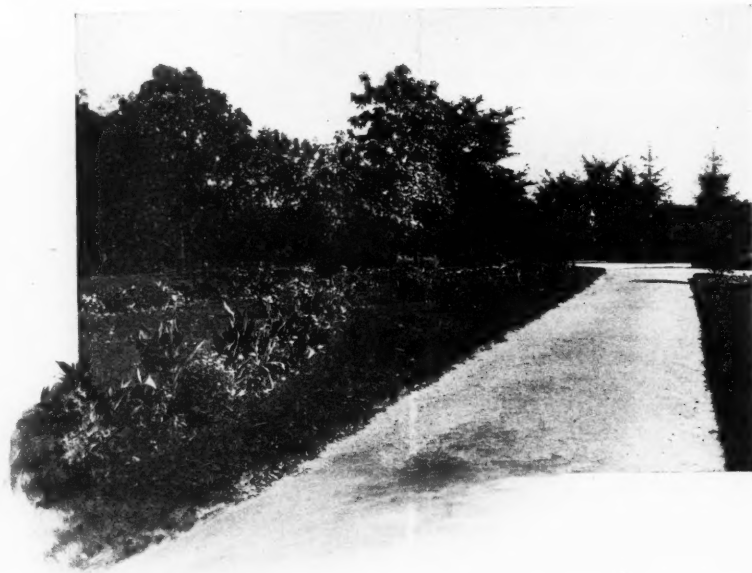
Pavements in Politics

It is not often that street paving attains the dignity of being used as a plank in a party platform, but this is what has happened at Binghamton, N. Y., where the declaration of

principles and policy adopted by one of the competing factions include the following section:

"Experience has thoroughly convinced us that no more asphalt pavements should be laid. No amount of discussion as to the excellence of such pavements elsewhere should be sufficient to warrant the further use of asphalt here, in view of the palpable results of a fifteen years' test before our eyes. We demand that such further sums as are spent upon streets now paved with asphalt, be laid out so as to ensure permanent rather than temporary improvements."

In another section the action of the present administration "in granting valuable franchise rights in perpetuity and without compensation to the city" is strongly denounced,



MINNEHAHA PARK, MINNEAPOLIS

the successful municipal operation of the water-works being cited as proof of civic ability to control a great public utility.

A REVIVAL OF MACADAM is among the possibilities consequent upon the annexation of outside districts at Baltimore, a preference for this form of street construction being expressed in many petitions from what is known as the Annex. City Engineer Fendall states that macadam is at least one half cheaper than any other form of smooth pavement, the next in order being vitrified brick and sheet asphalt. He considers macadam well adapted for traffic of a light character, and good for a dozen years if well laid. Full weight has been given to the objection on the score of dust, but the authorities find encouragement in the example of Boston, where liberal sprinkling is claimed to meet the difficulty. In this connection, too, the feasibility of oiling the road surface has been discussed, the contention being that one or two oilings per year will meet the requirements of the case.



BATHING POOL, LAKE HARRIET, MINNEAPOLIS

Concrete Without Gravel

THE increasing use of cement concrete for structures to which no idea of applying this material was entertained until within the last few years has had the effect of directing special attention to the proportions in which the different constituents should be used for various purposes. Hitherto, the accepted idea has been that, however much these might be changed to meet the views of individual engineers and architects, a considerable amount of gravel or broken stone, or material equivalent thereto, was an essential ingredient. In what is known as the "Weber Chimney," however, built of "concrete" and steel, the former material is composed exclusively of cement and sand, in the respective proportions of one to three, the practical success of this new departure being shown by numerous chimneys built on this system. These range from forty to 350 feet in height, the general principles of construction being the same in all. External and internal moulds, removable as the structure is carried up, ensure accuracy of form, while the vertical and horizontal reinforcement, composed of the usual steel bars, is readily inserted at the different stages. It is claimed for this type of construction that a chimney needs only about half the basic area of a self-supporting steel chimney and from one-third to one-fourth that of a brick chimney having the same internal diameter and height. Weber chimneys are built with double shells, as in the case of other types, and it is found that the dense material used has excellent heat resisting properties.

A RETROGRESSION IN IDEAS is manifested in an appeal recently issued by a City League, stating that the city was desirous of having a sewerage system installed but, being unable to take up the burden, would grant a liberal franchise to a sewerage company. Amid all the discussion of what constitutes the province of a municipality, the fact stands out prominently that the sewerage of a city or other area is a matter in which no intermediary shall stand between the public authority and the citizen. The case in regard to water supply, strongly as it points to municipal ownership, is more open to argument than the suggestion that a city should hand over its sewerage system in the manner proposed. And, apart from that standpoint, there is the further consideration that if a city is able to mortgage its revenues in order to offer inducements to a speculative corporation, it is at least equally able to finance the construction of a public utility inseparable from our modern civilization and belonging to the governing body as surely as the sun belongs to the day whose course and duration it determines.

MUNICIPAL OWNERSHIP IN CANADA will find support among those studying the results achieved in Kingston, Ont. "The Canadian Municipal Journal" states that eleven months' ownership of the gas and electric light plants has resulted in gas being reduced from \$2.00 to \$1.50 per thousand, and electricity from 14 cents to 12 cents per unit, while \$3,400 has been spent in repairs.



LAKE HARRIET PAVILION, MINNEAPOLIS

A MUNICIPAL LABORATORY



DR. T. VICTOR KEENE

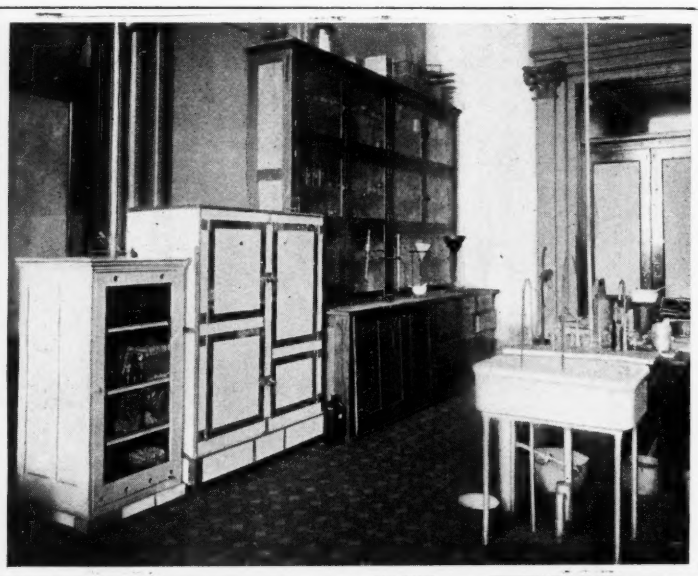
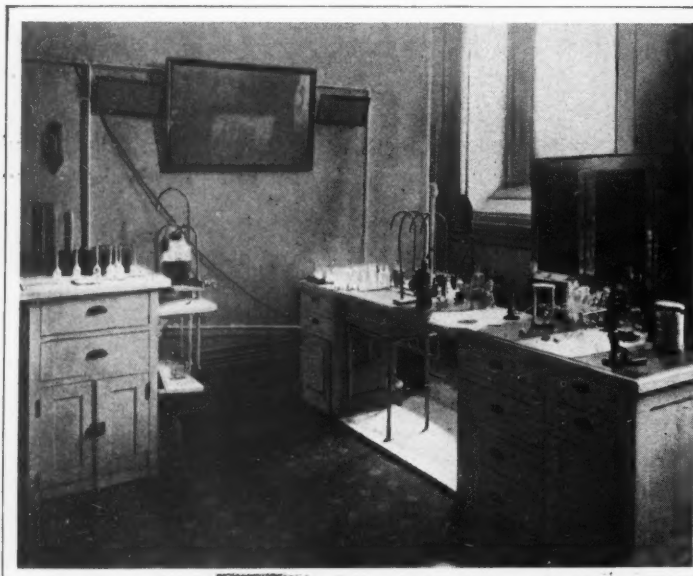
MUNICIPAL economy, as understood to-day, demands that every progressive city shall maintain a well equipped chemical and bacteriological laboratory for the purpose of carefully scrutinizing the water, milk and other food supplies so intimately related to the health and well being of the entire community, as well as to aid in making early diagnoses of contagious diseases. Recognizing this necessity, the City of Indianapolis has organized an institution of this character, and the results already obtained more than justify the expenditure entailed.

For a number of years occasional observations along these lines had been made under the direction of the Board of Health. The so-called laboratory, a mere adjunct of minor

The chemical tests, made to determine the chlorine and nitrites, are simple in character, the more elaborate work of isolating the various organisms being done on bacteriological lines. Tests are made for the *colon bacillus*, whose presence is held to indicate sewage contamination. Various processes are employed for testing the quality of the water supplied by the local Company, this being of special importance as affecting the continuous efficiency of the filtration plant recently installed.

In addition to water examination, tests are made daily to ascertain the quality of the milk supply. Vigorous prosecutions follow the detection of any milk falling below the City standard, which calls for a minimum of 3.6 per cent. of butter fat. Butter analyses are also made whenever suspicion points to the sale of substitutes, offenders being turned over to the Federal authorities.

The laboratory gives valuable assistance to doctors in



INDIANAPOLIS BOARD OF HEALTH LABORATORY: TWO INTERIOR VIEWS

importance, was administered on anything but scientific lines, although the City's charter requires the head of the Department to be an experienced bacteriologist.

Recognizing the need of reform in this direction, the present Health Department appointed Dr. T. Victor Keene to the office, and authorized him to fit up such a laboratory as he considered necessary. Dr. Keene, a technical man, bought for the City, as he would have done for his own laboratory, economically and of the best; although the funds were limited, the laboratory is adequate to the City's needs.

As the City's water supply is drawn from the White river, the original equipment was chosen mainly with the view of making water analyses, the method originated by Dr. Theobald Smith being adopted as best suited to the local requirements. From thirty to forty samples of water from the public supply, taken in various parts of the City, are collected every day and put through a series of tests, both chemical and bacteriological.

making early diagnoses of contagious diseases. Typhoid outfits, consisting of mica plates and filter paper, for taking samples of blood, are supplied free of charge by the Health Department to all doctors, who forward them to the laboratory, where they are examined and promptly reported upon, first by telephone and later by card sent to the doctor in charge.

Outfits for diphtheria tests consist of a sterilized tongue depressor, a swab and a box of culture media. A portion of the suspected throat membrane thus secured is sent to the Department and the same routine is then followed as in the case of typhoid fever.

The inroads of tuberculosis are also being combatted, the Health Department making free sputum examinations in suspicious cases referred to it. It is believed that these and kindred methods will ultimately enable the authorities of Indianapolis to materially lessen the mortality record of the City.

An English Automobile Fire Apparatus

THE city of Leicester, with a population nearly reaching the quarter-million mark, maintains the reputation it has long enjoyed of being among the most advanced English cities in municipal progress. The Fire Department, not to be left behind in the record, has added an automobile chemical engine to its equipment, of which the courtesy of Mr. George E. Mawbey, M. Inst. C. E., Borough Engineer, enables us to place an illustration before our readers. The engine is of the four-cylinder type, its twenty-four horse-power enabling it to attain a speed of twenty-five miles an hour. The copper cylinder carries a charge of sixty U. S. gallons, and there are 180 feet of 1-inch rubber hose attached. A hose-box carries 250 yards of canvas hose, and two portable three-gallon chemical extinguishers are carried on the footboard. A pair of scaling ladders, reaching to second-floor windows, is an additional adjunct to what should form a very effective piece of apparatus. It has already turned out to thirteen calls, and been used with satisfactory results on four occasions.

The engine was produced by the Wolseley Motor Car Company, of Wolverhampton, the chemical cylinder and hose reel being by Messrs. Sinclair & Co., London. These particulars are extracted from the report of Chief Ely for 1904.

Public Baths for Indianapolis

By next summer, Indianapolis will have two public bath houses, where the people may enjoy a swim free of charge. Although an inland city and far removed from any navigable water, there are three streams running through the city which offer good facilities for bathing and these are now to be taken advantage of, the city having appropriated \$4,500 for the equipment of two bathing places. There have been several fatalities, due to the absence of safe bathing facilities.

Garbage Reduction at Bridgeport, Conn.

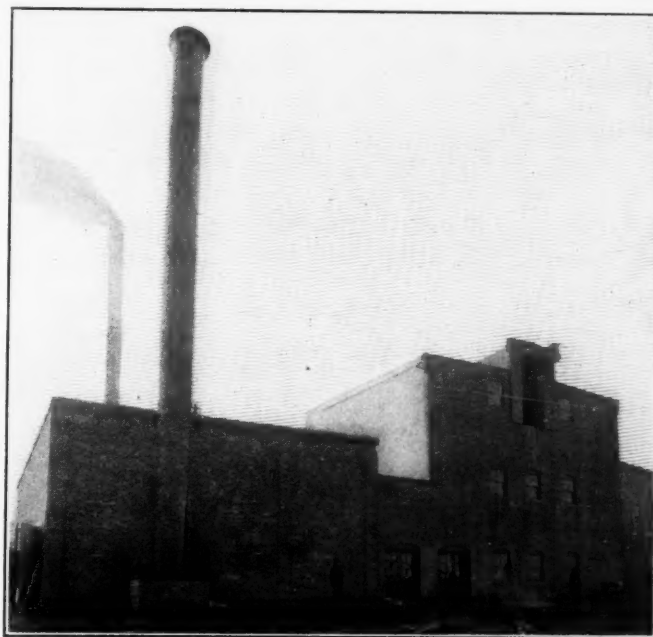
THE city of Bridgeport, Conn., collects its garbage, not including ashes, by contract, paying \$2.73 per ton for all garbage collected, this method of payment being adopted as making it to the contractor's interest to collect the largest amount possible. The contractor delivers the garbage to a reduction plant, shown in the accompanying illustration, which is owned and operated by the Bridgeport By-Products Company, the relations between the Company and the City being controlled by a ten-years' lease. Under this, the Company pays the City fifty cents per ton for all garbage delivered at the plant, and there deals with it in the same way

as in Toledo, Ohio, described on page 154 of last month's MUNICIPAL JOURNAL. The steam-jacketed digesters hold five tons of garbage each, and as the cooking process is carried on with an excess of air pressure over steam pressure



AUTOMOBILE CHEMICAL ENGINE: LEICESTER, ENG.

no ebullition takes place, the mass lying in a quiet state throughout. As in the case of Toledo, the cooking process is followed by drying in closed vessels, a vacuum being constantly maintained in the dryer, and any fumes or gases remaining after condensing are consumed under the furnace. The removal of the grease by the naphtha process completes the process in so far as garbage disposal is concerned, but the residual matter is carried forward for sale to fertilizer manufacturers, the grease finding a ready market among soap-makers, etc.



GARBAGE REDUCTION PLANT, BRIDGEPORT, CONN.

AMERICAN PERIODICALS REVIEWED

American Municipal Government

AN article in the July number of "The American Journal of Sociology" bears so closely upon the requisites of successful municipal government as to justify a belated reference to it. In "The Relation of Municipal Government to American Democratic Ideals," Prof. L. S. Rowe, of the University of Pennsylvania, contrasts the conditions out of which American ideas of local government developed with the circumstances now confronting us. Maintaining that the menace to individual liberty from the tyranny of government is no longer a real one, he finds a countervailing evil in the growth of great industrial centers, as bringing with it new problems which must be faced. "The widening gap between the life of the community and the activities of our city governments is impressing itself on every student of American city life. The first step in the development of greater civic vigor is a method of bridging this gap which shall include, primarily, such an extension of municipal functions that the community will be able to grapple with the problems which cannot be solved without organized action." The author proceeds to discuss the prevalent idea, fostered by political traditions with which he is apparently out of sympathy, "that the higher administrative offices of the city, no matter what their functions, shall be chosen by popular election." He shows that American opinion is coming round to the idea of uni-cameral city government, *small membership* of the single chamber being essential if responsibility is to be enforced. "Placing the mayor as a check upon the council, and the council as a check upon the mayor, has served to strengthen that most baneful of political superstitions—the belief in a self-acting governmental mechanism which will carry on the work of government without the need of watchfulness and alertness on the part of the people." He believes that the modified council must be deprived of all participation in the appointment of executive officials, and has no fear of giving the mayor greater executive powers if thereby the council can be saved.

[The above forms part of a paper contributed by Prof. Rowe to the New York Conference for Good City Government, held in April last under the auspices of the National Municipal League. The author's views on German municipal ownership appear elsewhere in this issue of the MUNICIPAL JOURNAL.]

The Effects of City Life

In an article on "Democracy and City Life in America" ("The State," October 14th), Mr. Henry A. Barker reviews the forces tending toward the destruction of democracy—absent from no part of latter-day existence but culminating in cities. "The city is, indeed, the visible symbol of the annihilation of distance, and the multiplication of interests." Mr. Barker regards certain things as essential to the success of democracy. "In the first place, the great body of the people must be intelligent and have a large social capacity, which means that they must be able to see beyond

their own garden fences and be able to co-operate with other men of considerably different habits and ideals. The second great requisite for the success of democracy, namely, a strong practical interest in local institutions, has suffered a good deal from the industrial expansion of the last century. The development of railways, steamships, telegraphs, telephones, and other means of travel and communication has given men a certain apparent, though partly superficial, independence of locality. Men must still have places, but in the great cities they are piled up, one on top of another; or they have two places, one for business and one for home. In the latter case, political boundary lines are practically powerless, and men readily abandon their citizenship in ward, city, or even commonwealth, at the dictation of non-political interests. Furthermore, the growing habit of travel, and especially of a change of residence during the heat of summer or the cold of winter, tends to detach men from local interests and render them unable to perform political functions. This fluidity of movement is marked among the well-to-do and the intelligent, so that the normal influence of these classes upon local political action is still further curtailed. They are enabled to escape from unwholesome local conditions which it is the business of political co-operation to remove or ameliorate."

The growth of cities, and the attendant influences inimical to the maintenance of our old-time individuality, are touched upon in an optimistic spirit, but there will be many who look with more curiosity than hopefulness towards the day when the dream indulged in by the writer will assume a more tangible form. "There are not wanting indications that the time may come when, instead of being prostituted to national party interests, municipal issues will take their turn at domination and themselves determine the lines along which national political struggles will be fought. Democracy, the tool with which we are cultivating human nature in America, has been badly damaged by its contact with city conditions. We must repair it, and perfect it, or find ourselves suddenly set back into political barbarism."

Public and Private Corruption

"THE Outlook" of October 14 contains an article on "The Spirit of Graft," by Clifford Howard, editorially commented on in the same issue. The writer of the latter reflections sounds a note of warning against the too readily adopted assumption that politics is necessarily defiling. "In the minds of most people there is a suggestion of the sordid in the very name politician. The word 'graft,' as used to denote personal profit acquired by the misuse of power, authority, or trust, is generally applied to the illegitimate gains only of public officials or Government employees. . . . This notion is used to reinforce the arguments of those who consider that government best which governs least. It lurks in almost every argument against the municipal ownership and operation of public utilities; it is implicit in every protest which is made against the enlargement of governmental functions, on the ground that such enlargement means an extension of grafting operations."

Contrary to this view, the editorial writer believes that the public service has no monopoly in the practices to which Mr. Howard's article refers, and doubts even whether graft flourishes as much in the public service as in private business. "It is not a mere coincidence that at the time when the Nation has been shamed by the discovery of frauds in the disposal of public lands, it has been astounded by the revelation of far deeper-seated wrong in the conduct of private companies carrying on the business of life insurance. Both disclosures are the result of a popular impulse—which has recently stirred the whole American people, as mysteriously as the impulse to stampede stirs the herd on the plain—to bring rascality, dishonest practices, and parasitic 'systems' to light. The pitiful pretense of the Senator who pleads that he is serving his constituents when he enables a political supporter to profit at the expense of the Federal Government is more than matched by the effrontery of the officer of an insurance company who talks about the surreptitious temporary transfer of untrustworthy securities as if it were a *bona fide* sale in the interest of the policyholders. . . . A grafter is a grafter, whether he is the servant of the whole body of citizens, or of a large number of policyholders, or of a limited number of stockholders, or of a single individual."

As for the remedy for conditions whose existence is only too plainly revealed, the writer is disposed to find it in "the cultivation of intellectual discrimination and of moral sensitiveness. The man who would be honest must have his wits about him as well as his conscience. It is not always easy to tell where an action passes beyond the limits of the legitimate."

Public Utilities in Colorado

The October "Arena" contains a continuation of Hon. J. Warner Mills' account of "The Economic Struggle in Colorado," in which the dominant trusts and corporations are handled without so much as a pretence of gloves. Particular attention is given to the city of Denver, where, owing to "a synchronism in their expiring franchises, 'it is imperatively necessary that within the next five years something must be done with reference to nearly every public utility in the City.'" A table originally designed to show the dates at which existing franchises will terminate reveals a condition akin to that governing the existence of snakes in Iceland, for in many cases "the easy Council at the City Hall has placed upon these particular franchises no *express* limit of any kind." The local Tramway Company has not been slow to claim, on the basis of this neglect, that its franchise is perpetual; if this could be made good it would follow that "every utility except 'water' can enrage the citizens and embarrass municipal-ownership with one or more unending grants of perpetuity."

In the face of such conditions, the Denver Municipal Ownership League, founded last June as the result of the union of two voluntary groups of citizens interested in the subject, sprang into being none too soon; its declaration of principles is as follows:

"The municipal-ownership of public utilities, due regard

being had at all times for the best interests of the people; the acquisition of the existing plants at a fair compensation, and in case purchase at a fair price cannot be had, then the City shall construct new plants."

The author's definition of a franchise as "licensed inequality"—"in its very essence inequality before the law"—may serve to indicate the ground taken in these powerful articles, which are well deserving of careful study by thousands to whom Colorado is merely a geographical expression.

High Pressure Water Supplies

"Insurance Engineering" for September contains a lengthy article on "City Water-Works Systems" by Mr. E. G. Hopson, who, as Chief Engineer of the National Board of Underwriters' Committee of Twenty, writes with an authority demanding attention. In that sense, there are many cities which would do well to ponder over his arguments in favor of high pressures for city supplies.

"The high pressure," he writes, "derived from a satisfactory water-works system is always available and ready for use. No pumps have to be started, nor fire departments called in to make connections with fire engines; all the various uncertainties inherent to complicated mechanical apparatus, to negligence of watchmen, to accident or other reasons are to a great extent removed by this method of supply, not only to the great economic advantage of the owner, but to a decided advantage from the fire protection standpoint. . . . A distribution system with mains of satisfactory size and arrangement and under pressures from 80 to 100 pounds can furnish fairly effective hose streams, ample for most inside as well as much outside work, direct from hydrants without the intervention of a fire engine."

Such a service would probably have saved the bad secondary conflagration in Paterson, N. J., had one been available. It should be remembered that high pressures at hydrants enable a fire department to multiply the number of hose streams to an almost indefinite extent when the street mains are well proportioned."

Another reason advanced in favor of high pressures—the greater quantity thus deliverable from the mains—has an important bearing upon the general efficiency of a water-works system: "The high pressure represents a latent power or reserve force inducing large capacity for delivery during unusual drafts. As an example, take New York City. Under its present low-pressure regime it can readily be imagined that under the stress of an abnormal draft in the downtown districts the ultimate capacity of the mains might be reached and large districts left temporarily without supply. The present pressures probably approximate from 30 to 40 pounds, but if they were in the vicinity of 90 or 100 pounds, fed by a reservoir at sufficient elevation, the force of gravity would have a much greater influence on the supply that might be drawn from the downtown mains, or, in other words, there would be a greater reserve force to overcome the friction loss incurred in the great length of pipe between the reservoir and the points of delivery. In many cases a high-pressure system represents an actual saving in sizes of main feeders."

Municipal Accounting

"The Engineering Record" of October 14 takes up the report of the Committee on Municipal Data and Statistics, read at the Montreal Convention of the American Society of Municipal Improvements, and expresses the opinion that not even the most enthusiastic advocate of standardization in public accounts could consider it encouraging. Referring to the fact that Mr. Fortune, Chairman of the Committee, who read the report, has been advocating uniform methods of reporting such data for a number of years, and that his ideas have been endorsed by the Society, the "Record" regards it as "highly instructive to observe that not a single city has paid the slightest attention to them. His views have been strongly endorsed by a number of people who have investigated the subject, but the reform is still to come. It is not at all surprising just now, when investigating committees are bringing to light many accounts which eminent 'magnates' probably consider insufficiently draped for exposure to the public eye, if uniform municipal accounting does not arouse popular enthusiasm. The methods of bookkeeping revealed by the insurance investigation in New York and the remarks of the scandalized judge in Missouri concerning the voting of Wabash proxies, have pretty thoroughly convinced people that the form of a financial report amounts to very little. The manner in which the figures are compiled is everything." Deprecating the idea that the "Record" is not in sympathy with the movement for uniform reports, the conviction is expressed that "the uniformity in water-works reports which is slowly developing as the result of persistent endeavor by the New England Water Works Association is one of the best public achievements to the credit of American technical societies. But this conviction is accompanied by one equally firm, that to urge uniform reports without more uniform systems of government is to attempt to drive with the cart before the horse. It is not surprising that most cities prefer their own ways of carrying on the public affairs, and resent any attempt to change them. They are not to be blamed for opposing an attempt to saddle a place of ten thousand population with a form of government suitable for a city ten times as large merely for the purpose of uniform accounting."

Electrical Power Plants

"The Electrical Review" of October 14 directs attention to "an interesting phase of the electrical awakening which seems to be going on in England," and suggests the possibility of joint action among American manufacturing towns on the lines now being followed on the other side. Large electric power plants, intended to deliver current for light and power purposes over large areas, are making headway in England, and the "Review" thus refers to a typical plant, that of the Yorkshire Electric Power Company:

"This Company is preparing to erect power stations and deliver current through a section of country having an area of about 1,800 square miles. The district contains eighteen boroughs and 118 towns, besides a number of rural sections. The power consumers are textile mills, mines and manufacturing establishments of various kinds, and it is estimated that they are now using about 3,000,000 steam horse-power.

The Yorkshire Company has authority to build five generating stations and to dispose of power throughout the entire district, except where it comes in conflict with certain municipal plants now existing. At the present time, one of the main power-houses has been put into service, and a number of sub-stations have been erected. The system will be extended as rapidly as the demand for power warrants. This Yorkshire undertaking is in striking contrast to the conditions prevailing in a number of British cities, notably London, where there is a large number of small plants operating independently and most probably inefficiently. The Yorkshire factories, on the other hand, will draw power from a large, and therefore reliable, plant which will generate its power on a scale which will make it cheap. The factories will have an opportunity—which, no doubt, large numbers of them will grasp—of discarding the old, clumsy and inefficient steam drive for the new electric drive, and thereby will not only get better work out of their shops, but will be able to do more of it."

The City Beautiful

AN article on the beautifying of towns and cities, in the "Municipal World" for October, urges that a city's highest charm does not lie in palatial dwellings or splendid public business structures, but rather in the development of its natural advantages. "To city officials belongs the duty of keeping the streets in good order, eliminating unsightly telephone and telegraph poles and burying their wires, abolishing the smoke nuisance, taking care of public buildings and their environs and performing many other requirements in the interest of the city's convenience, beauty, and sanitation.

"But everything must not be left to city boards and councils. Every occupant of a home, whether owned or rented, should feel under obligations to keep it in good order, so that the unsightliness of house and grounds may not be an eyesore to the public. In most cities local improvement societies are doing much to promote the beauty and healthfulness of their neighborhoods, and by the aid of these societies many a once unattractive country village has been made beautiful."

Literature and Travel

THE literary contents of the October number of "Four-Track News," apart from the always interesting special matter relating to travel and vacation resorts, are of an attractive and readable character and should tend to an increase of its already extended circle of readers. Among the articles calling for comment we notice "Camp-fire Reveries," "Where Romance Lingers," and "The Capital of King Alfred," all of which introduce the reader to quiet retreats now becoming more scarce as the dimensions of this earth of ours are shrunk, relatively, by modern traffic facilities. "Barrie's Thrums," in like manner, opens up a delightful view of Kirriemuir, where the novelist and chronicler of its doings was born and where his summer residence shares with his earlier abode the interest and attentions of thousands who yearly visit the little Scotch town.

LITERATURE ON MUNICIPAL TOPICS*

Reviews of Some Important Books—Municipal Reports Received

High Tension Power Transmission (cloth 8vo., 466 pages, \$3.00) is a re-publication, by the McGraw Publishing Company, New York, of a series of papers and discussions presented at meetings of the American Institute of Electrical Engineers, under the auspices of the Committee on High Tension Transmission. The appearance, in this form, of these valuable contributions to the literature of this subject will be a boon to the large number who were unable to attend these meetings, held at wide intervals of time and space, and have no previous means of informing themselves as to the opinions expressed. The papers cover an extensive field, and the views elicited from practical electricians in the discussions will probably stand on a level plane of value with the papers themselves.

Wireless Telegraphy: Its History, Theory and Practice. By A. Frederick Collins. Board cover, 8vo., 299 pages. Illustrated. Price \$3. Published by the McGraw Publishing Company, New York.

The early history, physical features and modern development of wireless telegraphy are thoroughly discussed in successive chapters, the various phases of this intricate subject being connected in series. The work is wholly technical, and is not designed to impart to laymen that little knowledge, spread over a large surface, which possesses special dangers in these latter days. On the other hand, the trained specialist will find in it a valuable storehouse of reference, without which the library of expert electricians and physicists will be admittedly incomplete.

Articles in American Periodicals

The New Lardner's Point Pumping Station, Philadelphia (illustrated).—*The Engineering Record*, New York, September 16.

Cement and Concrete Tests at the St. Louis Exposition (illustrated), by Richard L. Humphrey, M. Am. Soc. C. E.—*The Engineering News*, New York, September 21.

Municipal Improvements—The Plan, Part III., by Albert Kelsey.—*The Inland Architect and News Record*, Chicago, September. This article began in the July issue.

American Park Systems, Reviewed by Archibald A. Hill, Secretary, Metropolitan Parks Association of New York. *Charities*, New York, September 23.

Work of the Hydrographic Branch of the United States Geological Survey in New England and a Discussion of the Methods Used for Estimating Stream Flow (illustrated), by H. K. Barrows, Member of the Boston Society of Civil Engineers; read before the Society April 19, 1905.—*Journal of the Association of Engineering Societies*, Boston, Mass., July.—This is a valuable contribution to the literature of a subject of growing importance in its bearing upon water supply problems. The descriptions and

illustrations of the appliances used will be found of service by all who have occasion to take up researches of this character, even on the smaller scale usually required.

The Organization and Conduct of the Brooklyn Bureau of Street Repairs.—*The Engineering News*, New York, September 28.

The Manufacture of Concrete Blocks and Their Use in Building Construction, by H. H. Rice, Secretary, American Stone Company, Denver, Col.—*The Engineering News*, New York, October 5.—This paper received the first prize of \$250 in *The Engineering News* Competition.

The Scope of Reports of Engineering Documents.—*The Engineering News*, New York, October 12.

The Manufacture of Concrete Blocks and Their Use in Building Construction (profusely illustrated), by William M. Torrance, M. W. S. E., Assistant Engineer in Charge of Concrete-Steel Design, Hudson Companies, New York.—*The Engineering News*, New York, October 12.—This paper took the second prize in *The Engineering News* Competition.

Articles in Foreign Periodicals

Street Improvement, Concrete Sidewalks, Sewerage and Rock Crushers, by A. W. Campbell, M. Can. Soc. C. E.; *Water Rates* (illustrated), a paper presented at the meeting of the Ontario Municipal Association by F. MacKelcan, K. E.—*The Municipal World*, St. Thomas, Ont., September. Price, 10 cents.

Douglas (Isle of Man) Corporation Water-Works (illustrated).—*The Contract Journal and Specification Record*, London, Eng., September 13. Price 6½ pence.

The Discharge of Crude Sewage into the Sea, by George B. Latham, Assoc. M. Inst. C. E.—*The Sanitary Record*, London, Eng., September 14. Price 3 pence.

Wellington, New Zealand, a review of the municipal enterprise of. A paper read before the Association of Managers of Sewage Works, at Eccles, on the sewage and destructor works of that town, by G. W. Willis, the farm and works manager.—*The Contract Journal and Specification Record*, London, Eng., September 27. Price 6½ pence.

Public Documents Received

Nineteenth annual report of the Commissioner of Labor—*Wages and Hours of Labor—1904*. Washington, D. C.

Maryland Manual, 1904. A Compendium of Legal, Historical and Statistical Information relating to the State of Maryland. Compiled by Oswald Tilghman, Secretary of State.

Bulletin of the Bureau of Labor, July. Department of Commerce and Labor, Washington, D. C.

The Journal of the Franklin Institute, Philadelphia, Pa., October, 1905.

The Eighteenth Annual Statement—Street and Sewer Department, Wilmington, Del., 1905.

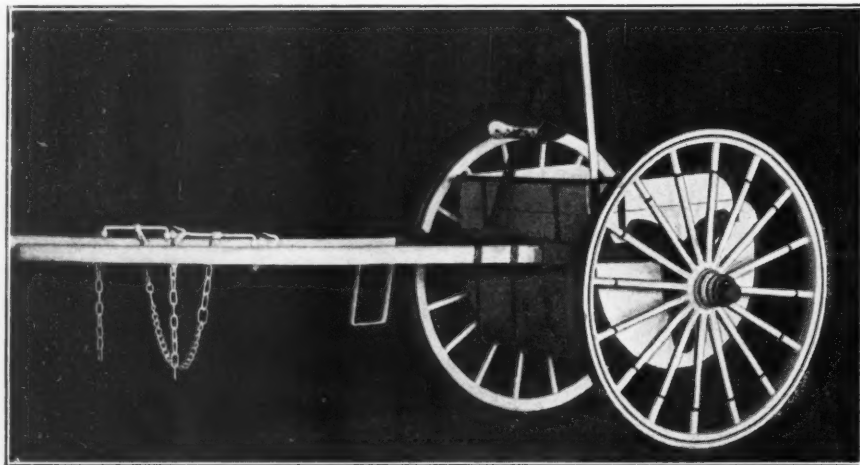
* Any book or periodical reviewed or mentioned in THE MUNICIPAL JOURNAL, or elsewhere, will be sent to any address on receipt of price.

Metering and Controlling

THE appended illustration conveys an accurate idea of the Hersey Detector Meter, to which reference has already been made in these pages. While capable of measuring drafts of water up to about 150 gallons per minute, as in the case of an ordinary meter, it is further arranged and intended to give intimation of the passage of any flow in excess of that volume. This is effected by the operation of a simple check valve on the fire-service or other main, which causes all small flows to pass through the adjoining by-pass meter; during the existence of this condition the check valve remains closed, but as soon as the rate of flow exceeds that stated, as it would do on the opening of a hydrant or gate beyond the meter, the check valve opens and allows the free passage of the water through the full-size main. By the use of a differential seat on the check valve, the separation of the valve from its seat sets free, for discharge into the atmosphere through the smaller meter, a small flow which will continue to be registered until the normal condition of the check valve is restored. In this way it becomes possible to gain an approximate idea of the length of time during which the flow through the main pipe was maintained. The apparatus is made in different forms to meet the variations arising in practice. Mr. J. A. Tilden, of the Hersey Manufacturing Company, South Boston, Mass., is the patentee.

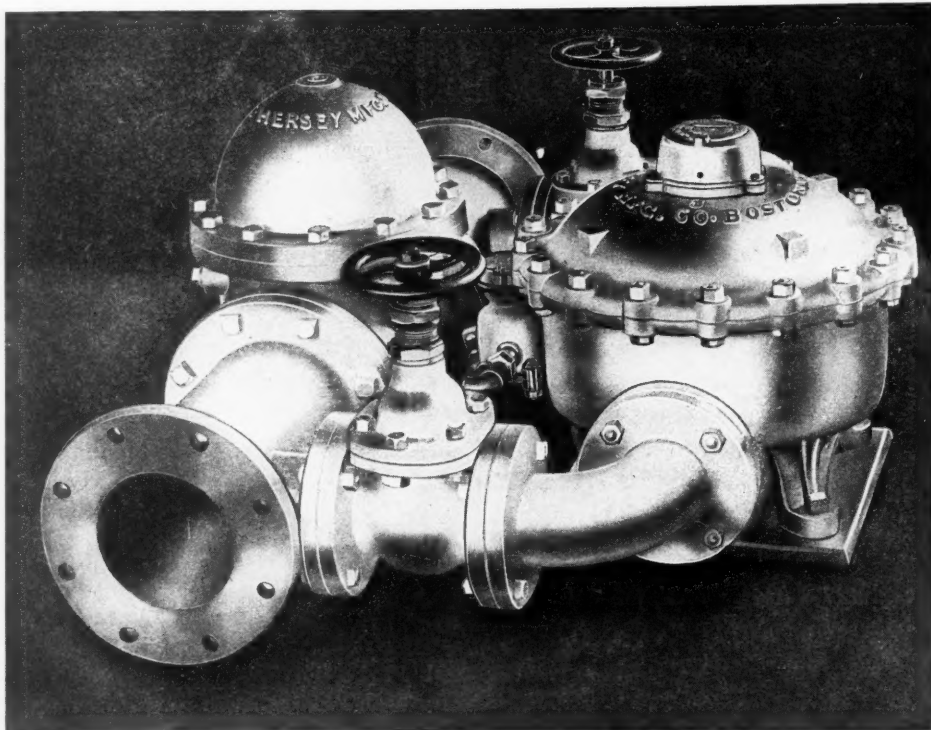
Carts and Dump Wagons on a New Principle

MUNICIPAL officials and public contractors throughout the country have been noting with special interest the new line of dumping wagons and carts being introduced by the Tiffin Wagon Co., Tiffin, Ohio. Their novel construction, combined with their special adaptability for various purposes, has been a real revelation to users, and is securing for the Tiffin product a degree of attention and



TUMBLER CART FOR MUNICIPAL WORK

patronage which must be most gratifying to the proprietors. At the Convention of the League of American Municipalities, recently held in Toledo, the Tiffin wagon and carts were on exhibition before municipal officials for the first time, and since the Convention nine of the cities there represented have taken up their use for various municipal purposes, handling of refuse, ashes, etc.



HERSEY DETECTOR METER

The tumbler cart shown below has many features of special interest to city officials, being so constructed that but little weight is thrown upon the horse. Being made without an axle, the steel bucket requires a little force, applied by a lever, to dump its contents; otherwise remaining stationary while being loaded. During this process the bucket can be tilted back and fastened so that a lift of only eighteen inches is required for loading—an advantage appealing to all practical men. This cart holds $1\frac{1}{8}$ cubic yard, or $1\frac{3}{4}$ yard when the steel extension sides are added. The same principle, applied to a quarry cart made by the Company, is of obvious value for the heavy material to be dealt with in that class of work.

Other types of vehicles, with four wheels, include a four-bucket wagon in which each bucket can be separately filled and dumped, special gear being arranged, when required, for supporting the buckets, clear of the axles. In this case, again, the buckets are hung enough out of the center to prevent dumping until the lever is applied.

Water-Works Engineering

AN office has been opened at Tompkinsville, New York City, by Mr. John B. Newhall, who has been connected during the last fifteen years with the Crystal and other water-works undertakings in Staten Island and elsewhere. He purposes paying special attention to underground water-supply, driven well plants, and the design of pumping machinery, a line of work fully covered by an experience of more than twenty years.

The Sewage Lift

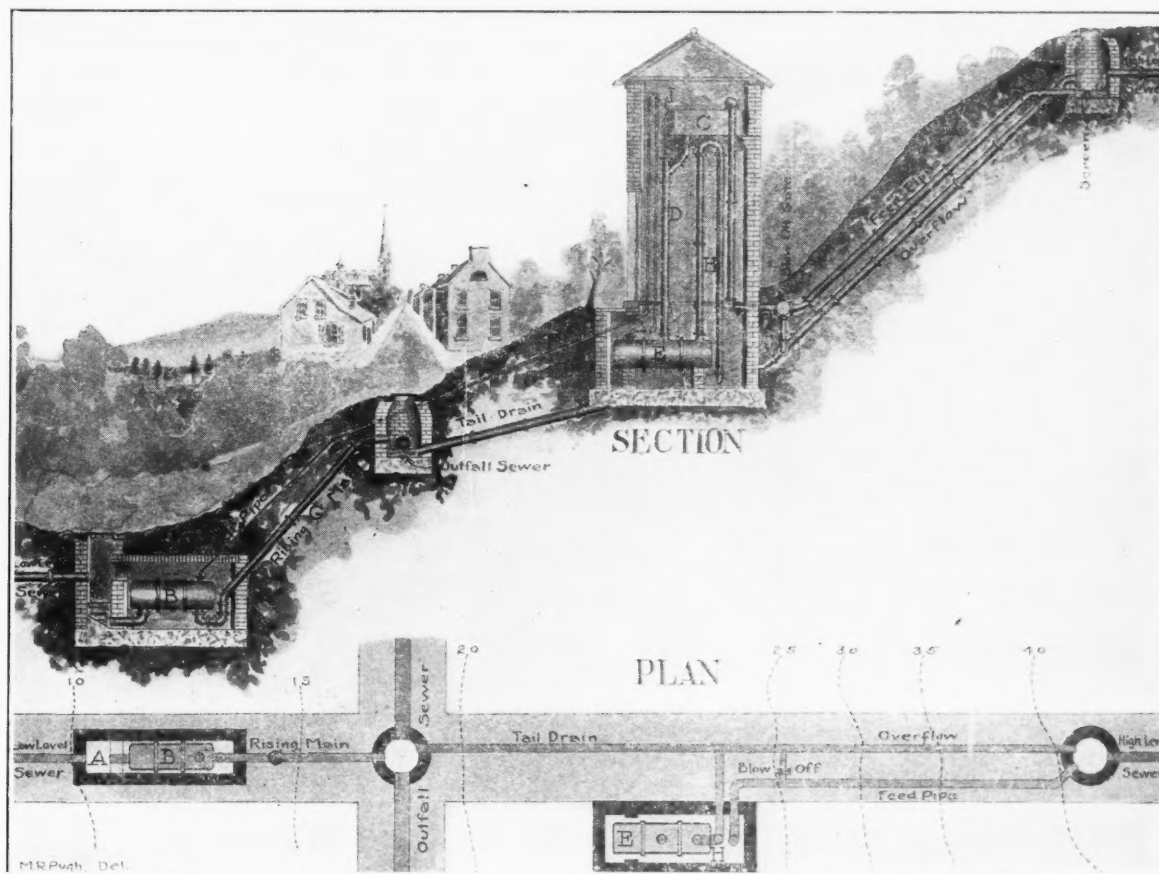
MUNICIPAL engineers are always striving to find the happy medium between economy and efficiency. Each case calls for a knowledge of the coefficient of economy for securing the best value for the tax payers.

In no respect, perhaps, is this more true than in the construction of sewerage systems. The question frequently arises as to the elevation at which the main sewer shall be laid. Shall it be so low that the sewage can gravitate into it from all parts, or shall the sewage in low-lying isolated districts be raised to the high-level sewers?

To decide this many things must be taken into consideration. The cost is naturally the chief item of importance. Shall the town incur the extra expense of a low-level sewer, or the lesser expense of installing a pumping device? The pump, of course, will entail a considerable cost of maintenance. Such a problem is perplexing, but it is possible to work it out, with almost mathematical

air, in turn, forces the sewage up. In many cases the sewage in high-level sewers may be utilized for the requisite head of water. In cases not quite so favorable, fresh water may be used for this purpose, but it is not necessarily wasted, as it can generally be used again after its function in air compression has been performed. As the lift works automatically, the expense of attendants is eliminated. There are occasions, of course, when it may be cheaper to pump sewage by ordinary methods, but it is always worth while for the engineer to give the Lift his careful consideration. The Automatic Sewage Lift was invented by Mr. S. H. Adams, of England, and has been improved by Mr. Albert Priestman, of Philadelphia. Merritt & Company, of 1024-1028 Ridge avenue, Philadelphia, the sole licensees in this country, are beginning to push its sale.

The method of operation is simple, and can easily be understood from a glance at the accompanying illustration. Some of the sewage from the high-level sewer flows into the flush-tank C at the top of



TYPICAL APPLICATION OF THE ADAMS SEWAGE LIFT

precision, if the cost of maintenance and the loss by wear and tear be approximated and taken into account. The system entailing the large initial cost may be much cheaper in the long run than that with the small cost and large maintenance. For example, it would be cheaper to spend \$5,000 extra on a sewer at a lower elevation than to construct a pumping station at a cost of \$1,000 with an annual maintenance cost of \$500, seeing that the cost of maintenance alone would be much greater than the 4 per cent. interest on \$5,000 bonded indebtedness.

There are many cases where it is beyond question that some kind of sewage lifting device is necessary, and in such instances the kind of lift must be decided upon. A device known as the Automatic Sewage Lift has proved most successful for this purpose. Its initial cost may or may not be greater than that of a pumping station, according to the local conditions, but its cost of maintenance is considerably less.

The lift makes use of a head of water to compress air, and the

the lift house. This flushes periodically and flows into the air cylinder E, driving the air into the forcing cylinder B. Low-level sewage has previously flowed into the forcing cylinder through a check valve, and is now forced up to the higher level by the compressed air. After this has taken place, the water siphons out of the air cylinder, and the plant is ready for the next flush.

There is only one moving part in the whole system—a simple flap valve. If it is held open by any hard substance it does not stop the action of the Lift, but merely reduces the volume of the discharge. At the next flow the solid is washed away and the valve comes to its seat again.

The Automatic Sewage Lift promises to play a new part in sewerage systems. It has been used in many places in England, where it has proved itself capable of working month in and month out without attention. Its freedom from mechanical gearing reduces to a minimum the chance of its getting out of order.

The Lift is economical for two reasons: First, because it requires

no attendants; and secondly, it makes use of the latent power in a head of stored up liquid as motive force, when otherwise this power would probably go to waste.

The Lift is probably used even more in buildings than in sewerage systems. Here the flush tank is generally situated on the top floor and fresh water is used for flushing. After the flush the water is used in raising the sewage from the lower drainage fixtures. Architects find that the Lift is not only an economy from the point of view of expense, but in regard to space. The various cylinders can be suspended from ceilings of closets or toilet rooms, and so take up very little room.

A Novel Proposition

THE Municipal Engineering and Contracting Company, Railway Exchange, Chicago, Ill., handling the "Chicago" Sewer Excavator advertised in this journal, makes a new departure in the conduct of its business—the result of the perfection to which these machines have been brought. Hitherto, they have been leased for work on only one contract at a time, but in response to a demand by contractors who wish to control the machine in their own territory, the Company is now prepared to grant leases for a term of years with exclusive privileges. The important part played by the excavation item in such work as sewer construction—for which this machine is peculiarly adapted—will have the effect of directing attention to the terms on which contractors can avail themselves of this up-to-date method of excavating trenches. The operation of the machine displays a radical departure from earlier methods of dealing with this problem, the actual excavation, and not merely the transport and disposition of the earth, being provided for.

Universal Portland Cement

THE annual output of the "Universal" Portland cement by the Illinois Steel Company (The Rookery, Chicago) has now reached two million barrels, or 6,000 barrels a day, a fact alone sufficient to show the position this material has won in a race fairly crowded with competitors. The Cement Department of the Company has recently issued an exceedingly well got up booklet, in which the composition, quality and application of the cement are clearly set forth; though made from crushed limestone and chilled blast furnace slag, the Company's product does not fall within the category of "slag" cements, the treatment of the materials, and the consequent difference in results, accounting for this distinction. The particulars given include statements of tests and appreciative references from users.

Creo-Resinate Wood Block Paving

THERE are some locations and uses in which the demands made upon a paving material are much more severe than in ordinary cases, among these being the flooring of stables, car-sheds, ferry-boats and workshops. These are only a few of the many instances which can be called to mind, but it will be readily apparent that any floor material capable of absorbing oil or urine is unfit, in that respect, for the purposes indicated, no matter what its general merits may be. A material especially suited to such locations is found in the wood blocks, treated by the Creo-resinate process, manufactured by the United States Wood Preserving Company, whose offices are at 29 Broadway, New York City.

In addition to their use for street paving generally, a special application is found for these blocks in filling the space between the

tracks of street railways, their resistance to the effects of oil from the driving gear being of special value in this connection. The catalogue shows their application to many purposes besides those now glanced at, and users will find much valuable information in its pages.

Fire Trucks

THE American-La France spring raising truck with controlling cylinder is meeting with much favor. Trucks are now being constructed for New York City, Philadelphia, Milwaukee, Indianapolis, New Haven and Allegheny. Among cities already having this style of truck in service are New York City, St. Louis, Indianapolis, Denver, Davenport, Iowa, Columbus, O., Chester, Pa., Muncie, Ind., and Grand Rapids, Mich.

The American-La France Fire Engine Co. is also building an eighty-five-foot Hayes aerial truck for Detroit and a fifty-five-foot Babcock aerial for West New York. In addition to the aerials mentioned above, New York City is having five combination trucks built by the same company.



THE "CHICAGO" SEWER TRENCH EXCAVATOR

Dump Cars

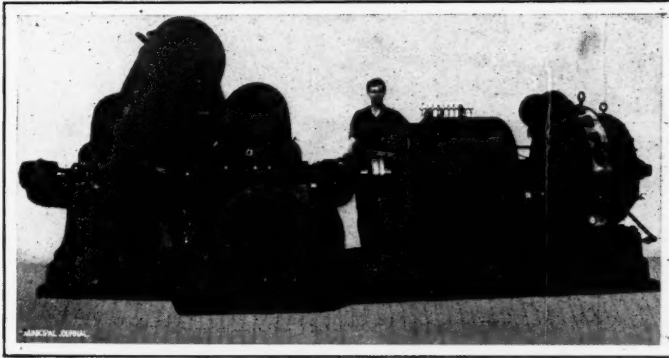
THE specialization now prevailing in manufacturing is well exemplified in a catalogue which we have just received, dealing exclusively with the various types and patterns of dump-cars produced by Kilgore-Peterler Company at their works in Minneapolis. The care devoted to the design and constructional features of these cars will come as a revelation to those who have occasion to investigate sources of supply in this field. The catalogue is copiously illustrated and contains complete measurements which will save correspondence when, possibly, time is an object with intending buyers.

An Eighty-five Foot Aerial Ladder

A TRUCK carrying a ladder of this height, equipped with Firestone "side wire" tires, has been shipped by the Seagrave Company of Columbus, O., to the fire department of Syracuse, N. Y., and is expected to form an important addition to Chief Quigley's apparatus. The same company has recently furnished a sixty-foot city service truck to Troy, N. Y., a hook-and-ladder truck to Tenaflly, N. J., and two combination wagons and a hose wagon to Shreveport, La.

Two Notable Pump Installations

THE De Laval Steam Turbine Company have recently erected what are practically identical pumping plants at Rochester and Brooklyn, N. Y., the plant in each case consisting of a 300 b. h. p.



DE LAVAL STEAM TURBINE CENTRIFUGAL PUMP

De Laval steam turbine centrifugal pump, the turbine being direct connected to two double-intake centrifugal pumps, coupled in series. The entire outfit rests upon a cast iron base measuring 17' 4" x 7' 3", weighing, approximately, 25,000 pounds.

The accompanying illustration shows the pump before being shipped from the shops.

The Brooklyn specifications called for a week's continuous run after installation and before the official test, which was conducted for the city by Mr. Reginald Bolton. The guarantees involved the attainment of "not less than 80,000,000 foot-pounds per million B. t. u., also to include the driving of a steam air-pump." The boiler pressure during the test was fixed at 150 pounds, with vacuum 27½ inches. The records show, for the two latter figures, 145.8 pounds and 24.84 inches, respectively, and a duty of 82,156,433 foot-pounds per million B. t. u. was recorded.

Bitulithic Pavement Infringement

WE learn that proof is now being taken in actions brought by Warren Brothers Company against the several cities referred to for infringement of their patents as follows:—

Owosso, Mich.—Patent No. 727,505, for pavement, issued to Frederick J. Warren, dated May 5, 1903.

Duluth, Minn.—Patent No. 715,630, issued December 9, 1902, to Frederick J. Warren for "Method of preparing the ingredients of street sheet pavements or roadways."

Duluth, Minn.—Patents Nos. 725,641-725,642, being patents issued to Horace W. Ash, April 14, 1903, assigned to Warren Brothers Company, respectively covering "Apparatus for preparing mineral ingredients of bituminous macadam or other pavements for use" and "Apparatus for grading minerals."

Muskegon, Mich.—Patent No. 727,505, referred to above. In Muskegon action was started for infringement of patent No. 675,430, issued June 4, 1901, to Frederick J. Warren for "Pavement or Roadway," but the complainants have decided, pending prosecution of patent No. 727,505, to temporarily withdraw the action on patent No. 675,430. It is claimed by Warren Brothers Company that in each case infringement has occurred on a number of their patents, but for the present they are only bringing action under those referred to above. In each case George O. G. Coale, of Boston, is Counsel for the complainants, and Henry L. Paul, Jr., of Philadelphia, is Counsel for the defendants.

Leaky Water and Gas Mains

A PUBLICATION issued by the Central Foundry Company, 116 N. Nassau street, New York City, contains some surprising statements relative to the proportionate volume of water and gas lost through defective mains. The subject is thoroughly discussed with the aid of representative examples, some of the more prominent being from English practice. "The disposition in this country (America) seems to be to conceal the facts, charge to 'consumption' an impossible daily per capita use, predict a water famine if the supply in sight does not promise at least 150 gallons per head per day in perpetuity, and clamor for new sources of supply, new reservoirs and larger mains." As one means of changing conditions which are, in themselves, proofs of indifference or worse, the pamphlet before us directs attention to the "Universal" pipe, in which the old-time reliance upon a jointing material is dispensed with.

Perhaps the most forcible argument in favor of these pipes is their immunity from the effects of electrolysis. The passage of a return current through a line of pipes does no harm—it is the exit of the current that causes the trouble—and it is claimed that the continuous character of this form of pipe—metal to metal—reduces the necessity for protective measures to points near power-houses, etc., where a ground wire should be installed.

"Who Lays the Dust"?

THE Hersey Manufacturing Company, of South Boston, Mass., asks this question in a neat pamphlet in which the commercial value of the water used in this operation is insisted on, water for this public service being a tax on the community just the same as water for municipal buildings, for schools and for fire protection. Even when supplied by municipal works it is perfectly logical that the city or other local authority should be credited, in its accounts, with the value of the water so used, and the pamphlet shows devices by which the Hersey Water Meter is adapted to that particular service. One of these is a special form of meter, placed on top of each watering-cart; or a meter can be attached to each standpipe from which water is drawn, in either case affording the requisite record.

As regards this record in the case of ordinary meter installations, the Company has a word to say to which another booklet is devoted. The time often wasted by meter readers in waiting for access to houses can be saved by placing the meter under the sidewalk, a special box and cover being among the Company's manufactures. This ensures adequate protection for the meter and admits of its easy removal for exchange or repair.

Bids Invited for Street Lighting

BIDS or propositions for the lighting of the City of La Porte, Ind., for a term of from one to ten years from January 1, 1906, with electric lights or gas lights, are invited. The City of La Porte has a population of 10,000, and is now using 123 two-thousand candle power electric lights, with some incandescents. Bidders are required to furnish specifications with bids or propositions for every night to 12 o'clock and every night all-night service, and state what kind of lights will be furnished. Each bid to be accompanied by a certified check in the sum of \$500, sealed and endorsed "Light Proposals," and filed with the City Clerk on or before December 1, 1905. The Common Council reserves the right to reject any and all bids.

C. E. WOLFE, City Clerk,
La Porte, Ind.

Southern Creosoting Company, Ltd.

SLIDELL, LOUISIANA.

Located in the finest Long Leaf Yellow Pine District in the United States. Capacity 22,000,000 feet B. M. per annum.

Fire Apparatus Sales for September

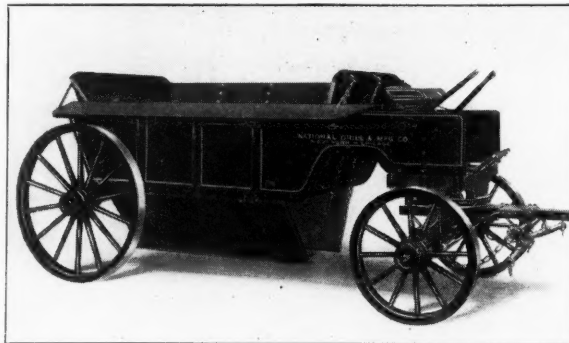
AN idea of the growth of Fire Departments throughout the country may be gathered from the circumstance that in the month of September one manufacturing company alone received orders for eleven steam fire engines and for the rebuilding of four others. The same company received orders during the month for seven combination chemical engines, one city truck, one hose wagon, eleven chemical engines and the rebuilding of one aerial truck. The apparatus completed for delivery included ten fire engines, six combination wagons, four chemical engines, four city trucks, one combination and one aerial truck. Seven engines were also rebuilt. Of the engines ordered from the American-La France Fire Engine Company, ten were Metropolitan and one a Silsby, six of the former being ordered by New York City and two by Kansas City, Kan. Of the engines completed for delivery, six were Metropolitan and the others La France. Seven of the chemical engines ordered were for South Africa.

Railroad Bridges

A PROMINENT factor in the adoption of Scherzer rolling lift bridges, an appliance to which an extended reference was made in our October issue, is the extent to which the multiplication of railroad tracks is being carried. It is no uncommon thing to find what were originally single-track roads with four or even six tracks in busy parts of the system. In this connection, an inherent limitation of the center-pier swing bridge is the fact that it cannot be enlarged or widened to accommodate additional tracks, while it is obviously impossible to build a parallel bridge of that type. This difficulty is overcome by the Scherzer bridge, which can be built as a single-track structure and subsequently enlarged to a double or multiple track bridge without interference with either the bridge or the traffic over it. In addition to American orders for these bridges, construction is being carried on in England and Ireland, as well as in Holland.

The National Automatic Dump Wagon

THE appended illustration shows the latest improved National Automatic Dump Wagon, designed particularly for hauling and dumping ashes, garbage and street refuse. The particular wagon shown is of four cubic yards capacity and is designed with particular reference to use by municipalities or municipal garbage contractors. Its principal advantages are that while it has a short wheel base it is no higher from the ground than others on the market; the arrangement of hinges is such that when the load is dumped, the doors are forced up on the outside of the wagon box, thus clearing all obstructions. The doors, of solid pressed steel,



are thoroughly re-enforced, both laterally and horizontally, by steel angle-irons; tight joints and consequent freedom from leakage are also a feature.

The wheels are made of second-growth ash or oak, and every inch of timber used is thoroughly seasoned and the best that the market affords. These wagons are made by the National Drill & Manufacturing Company, with headquarters at the Trinity Building, 111 Broadway, New York City.

Southern Bitulithic Company

Contractors for

Warren's Patent Bitulithic Pavement

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88 Arcade Building
NASHVILLE, TENN.

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Contemplating establishing plants
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**WATER POWERS,
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of the West and Northwest, and
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